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# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



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Bureau of Land Management  
Miles City District Office  
Miles City, Montana

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Prepared by  
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## ACKNOWLEDGEMENTS

This Bureau of Land Management (BLM) project was made possible through the cooperation and assistance of many individuals, most notably the landowners on the study area who graciously permitted access to their land and who shared their knowledge of wildlife on the area. Personnel in the Miles City District Office of the BLM contributed in a variety of ways. Dan Bricco and Gerry Gill provided supervisory support and critically reviewed the report; Bill Matthews critically reviewed the report and was especially helpful in the initial stages of the inventory; editorial review was provided by Jim Hetzer; Kathy Bockness and Gloria Gunther did the bulk of the typing. The following BLM personnel in the Montana State Office assisted in data processing and cartographic work: Daren Critelli, Larry Davis, Dora Flanagan, Don Johnson and Lela Seibel. The report benefitted from the suggestions of Arnold Dood, Tom Hinz, and especially Neil Martin and Jon Swenson all of the Montana Department of Fish, Wildlife and Parks. Aerial surveys were piloted by Stan Colton and Greg Ugrin. The assistance of all who contributed to this study is sincerely appreciated.



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# INTRODUCTION

This report presents the results of a four-season baseline wildlife inventory of an area with both federal surface and subsurface mineral estate and with coal leasing potential. The Bureau of Land Management (BLM) is the federal multiple use land management agency mandated with the responsibility of managing surface resource values on public lands and administering the federal mineral estate. Authority for this inventory is based on legal standards set by the Surface Mining Control and Reclamation Act of 1977 (PL 95-87) and its implementing regulations, which require planning and consideration for fish and wildlife, minimization of their loss, and protection and enhancement of these resources where practicable. The objectives of this inventory, which commenced in April 1981 and continued through April 1982, were to:

1. Identify and document the occurrence and distribution of terrestrial vertebrates, primarily mammals and birds, on the study area.
2. Identify and document critical wildlife habitat on the study area, such as big game wintering areas or grouse display grounds.
3. Identify and document wildlife utilization of specific areas, such as seasonal use areas and migration routes.
4. Identify and document any endangered or threatened species or species of special concern to the State of Montana and/or their habitat.

## DESCRIPTION OF THE AREA

The Southwest Glendive Study Area encompasses approximately 228 square miles in south Dawson County, Montana (Figure 1). The area is bordered on the north by State Highway 200 between the towns of Glendive and Lindsay; Interstate 94 crosses the area on the southeast corner.

Surface ownership is 93% private, 6.6% state and 0.4% federal. Approximately 42% of the subsurface coal mineral estate is in federal ownership with the remainder in state and private ownership. Primary land uses are livestock grazing and small grain farming.

### Climate

Cordell (1976) provides a description of the climate of Dawson County. In general, the county

has a continental climate with cold winters, warm summers, and a marked variation in seasonal precipitation. During a normal year, about 80 percent of the annual precipitation (12-14 inches) occurs between April and September, with June ordinarily the wettest month. Winter snowfall averages about 28 inches. Average daily maximum and minimum temperatures in January, the coldest month, are 27°F and 4°F, respectively; corresponding temperatures in July, the warmest month, are 90°F and 59°F (based upon records from Glendive for the period 1932-1961; from Cordell 1976).

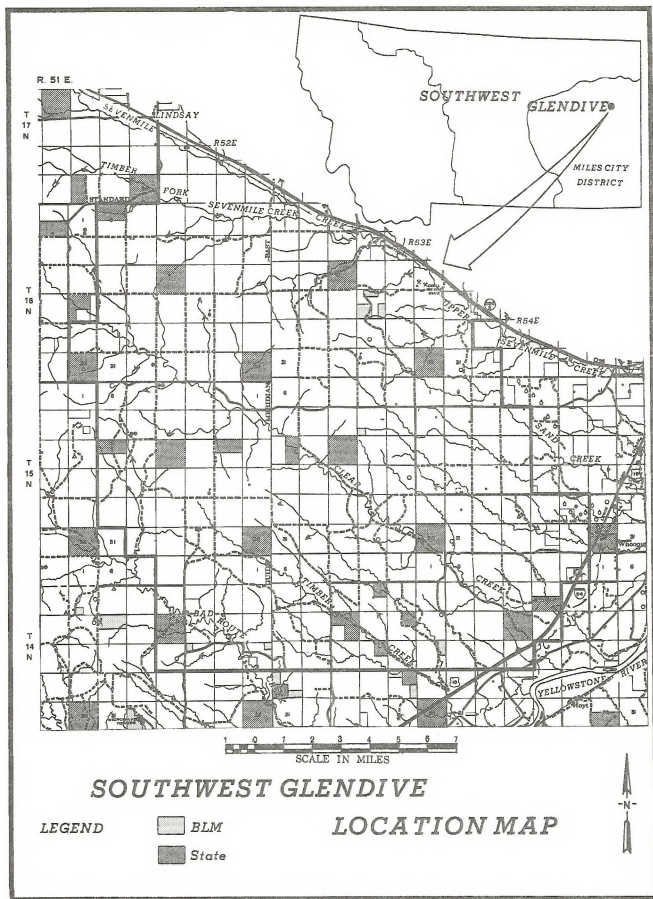
A warm, dry trend prevailed through the first half of the study period with temperatures averaging 2.75°F above normal and precipitation totalling 3.58 inches below average from April through September 1981. This trend shifted to cool and wet during the remainder of the study period with temperatures averaging 5.1°F below normal and precipitation 1.37 inches above average from December 1981 through April 1982. (National Oceanic and Atmospheric Administration 1981-82). Snowstorms were frequent during this period with the latest snowfall recorded in mid-April.

### Topography and Soils

The study area is on the eastern sedimentary plains (Ross and Hunter 1976) and is characterized by nearly level benches and undulating uplands incised by intermittent streams with gentle valley slopes. Major drainages (Sevenmile, Bad Route and Clear Creeks) flow in a southeasterly direction to the Yellowstone River. Badlands and breaks topography is limited in extent with the largest areas along Lower Sevenmile Creek in the northeastern part of the study area and along Bad Route Creek in the southwestern part. Elevations range from 2,180 feet on lower Clear Creek in the southeastern corner of the area to 2,946 feet along upper Clear Creek along the western boundary of the area.

Six soil associations occur on the study area (Holder and Pescador 1976):

The Cherry Association consists of nearly level to gently sloping, deep soils that are dominantly silty clay loam throughout. This association is located on the bottomlands of the three major drainages. Cropland and grassland vegetation types are characteristic of this association, but bottomland hardwoods along Bad Route Creek are also included.



The Lambert-Dimiyaw association occurs on the steep, dissected uplands between Clear Creek and Bad Route Creek. It is characterized by deep silt loams and silty clay loams underlain by silt loams, silty clay loam, or silty clay sedimentary beds. Grasslands predominate on this soil association.

The Lambert association occurs on undulating to strongly rolling and hilly uplands in the northeastern and southwestern portions of the study area. These soils are deep silt loams underlain by silt loam sedimentary beds. Grasslands and croplands are characteristic of this association, but several hardwood draws are included.

The Shambo-Lambert association is characterized by deep loams and silt loams underlain by stratified loam and silt loam alluvium and silt loam sedimentary beds. It occurs on the undulating to rolling and hilly uplands on the western half of the study area from the Sevenmile Creek bottom to south of Clear Creek. Cropland and grassland are dominant on this soil association.

The Farnuf association occurs on the nearly level to gently rolling uplands near the center of the study area both north and south of Clear Creek. These deep soils, with a loam surface layer and a clay loam subsoil, are underlain by loam to silty clay loam alluvium. Much of this association consists of cropland.

The Turner-Beaverton association occurs on nearly level to gently sloping upland soils on the eastern side of the study area in the Sand Creek—Whooopup Creek area and in the southeastern corner along lower Crackerbox and Timber Creeks. This association consists of deep soils with a loam or clay loam surface layer and a clay loam, gravelly clay loam, or sandy clay loam subsoil, underlain by sands or sandy gravel. Cropland is the most extensive use of this soil association.

## Vegetation Types

Grassland is the predominant habitat type (approximately 100,310 acres), comprising 68.2 percent of the study area (Fig. 2 & 2a). It occurs on the uplands and creek bottoms and includes breaks and badlands types, which are too scattered and restricted in size to be considered a separate type. Characteristic grasses and grass-like plants include blue grama (*Bouteloua gracilis*), needleandthread (*Stipa comata*), western wheatgrass (*Agropyron smithii*), prairie junegrass (*Koeleria cristata*), green needlegrass

(*Stipa viridula*), little bluestem (*Schizachyrium scoparium*), and threadleaf sedge (*Carex filifolia*). Forbs and half-shrubs include Hood's phlox (*Phlox hoodii*), prairie thermopsis (*Thermopsis rhombifolia*), yellow sweet clover (*Melilotus officinalis*), yarrow (*Achillea millefolium*), aster (*Aster* spp.), dandelion (*Taraxacum officinale*), woolly indianwheat (*Plantago patagonica*), prickly pear (*Opuntia polyacantha*), fringed sagewort (*Artemisia frigida*), and broom snakeweed (*Xanthocephalum sarothrae*). Shrubs such as skunkbrush sumac (*Rhus trilobata*), wild rose (*Rosa woodsii*), and silver sagebrush (*Artemisia cana*) are uncommon and widely distributed in this habitat type. Small patches of common juniper (*Juniperus communis*) are found in the limited breaks areas.

Cropland encompasses 30.6 percent of the study area (about 45,000 acres). The principal crop is winter wheat (*Triticum aestivum*), though barley (*Hordeum vulgare*) and oats (*Avena sativa*) are also raised. Hay meadows of alfalfa (*Medicago sativa*) and cultivated grasses, as well as fallow fields are included in this vegetation type.

Sagebrush-grassland covers less than one percent of the study area (approximately 660 acres); nearly all of this habitat type occurs in the northeast corner, along Sevenmile Creek, and in the southwest corner, along Bad Route Creek. In addition to silver sagebrush, this vegetation type contains many of the same grasses and forbs associated with the grassland type.

Bottomland hardwood is restricted to a narrow band of plains cottonwoods (*Populus deltoides*) along Bad Route Creek. A few boxelder (*Acer negundo*) and green ash (*Fraxinus pennsylvanicus*) are also present, as well as scattered clumps of buffaloberry (*Shepherdia canadensis*), willow (*Salix* sp.), and chokecherry (*Prunus virginiana*). Silver sagebrush, rose and snowberry (*Symphoricarpos albus*) are common in the understory. This habitat type comprises less than one percent of the study area (about 500 acres).

Hardwood draw habitat is limited to less than one percent of the study area (approximately 530 acres). Most of this type occurs in the northeast part of the area along tributaries of Sevenmile Creek, but is also found in the southwest corner in tributaries of Bad Route Creek. Green ash is the dominant plant in this vegetation type; other woody plants include aspen (*Populus tremuloides*), plains cottonwood, box elder, chokecherry, wild plum (*Prunus americana*), serviceberry (*Amelanchier alnifolia*), red osier



dogwood (*Cornus stolonifera*), buffaloberry, golden currant (*Ribes odoratum*), wild rose and snowberry.

Mesic shrub habitat also encompasses less than one percent of the study area (less than 500 acres) at the heads of drainages and in other mesic sites along drainages and grass swales. Vegetation consists of clones or patches of buffaloberry, chokecherry, serviceberry, plum, rose, snowberry or willow and includes isolated willows or cottonwood trees as well as shelterbelts.



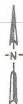


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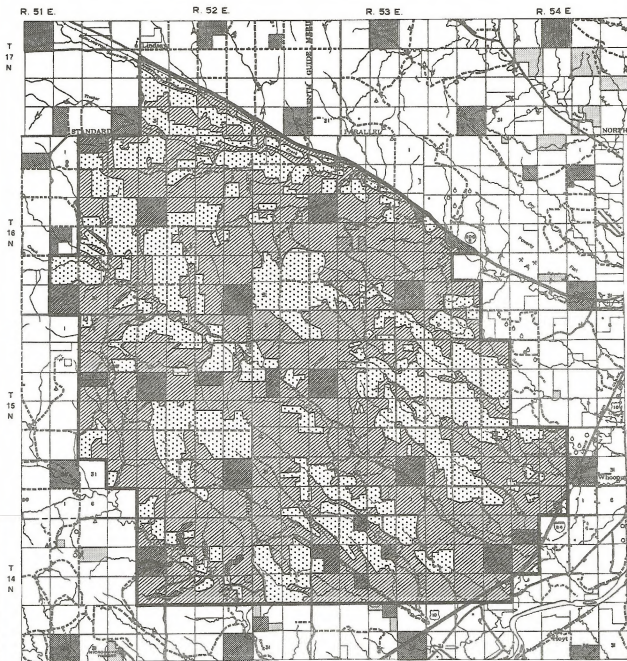
### LEGEND

— *Bottomland Hardwood*

— *Hardwood Draw*



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



1 2 3 4 5 6 7  
SCALE IN MILES

## VEGETATION INVENTORY

### LEGEND

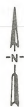
BLM

State

Sagebrush

Grassland

Agriculture



## METHODS

A variety of inventory techniques was utilized to document the occurrence, distribution and relative abundance of terrestrial vertebrates. Most observations were random or opportunistic sightings made while driving the county roads or walking through the various habitats on the study area. Data obtained from these walking and windshield surveys included species, sex, age class, group size, vegetation type and location (to nearest 0.1 mile). These observations provided for the derivation of seasonal habitat affinities for mammalian and avian species, big game population characteristics and general distribution and relative abundance data for all species. Attempts were made to sample all areas and habitats uniformly. However, weather and road conditions prevented access to some areas, especially during late winter and spring. In addition, access to about 7 percent of the study area was denied by one landowner.

A Bell B-2 helicopter was utilized for initial reconnaissance of the study area on April 9 and 10, 1981. During the early mornings, it was used to survey suitable habitat for sharp-tailed grouse display grounds and later in the day to search cliffs, buttes and woody habitats for raptor nests. Additional grouse display grounds were located and lekking males were censused using standard techniques (Pepper 1972) during April-May 1981 and March-April 1982. A pheasant crowing route (Gates 1966) was established and censused in May 1981.

Aerial surveys in a Cessna 182 were flown during early morning hours on January 21 and February 25, 1982, primarily to document pronghorn antelope and deer distribution and numbers. However, all mammalian and avian species were recorded. A standardized north-south route was flown at one-mile intervals on both mornings.

Small mammal trapping totaled 2,459 trapnights in the four major vegetation types during August and September 1981. Two traplines were placed in grassland, one in a western wheatgrass/needleandthread pasture and one in a blue grama dominated pasture. Two traplines were in hardwood draws, one with a largely closed canopy and one with a predominantly

open canopy. Three traplines were in agricultural types, two in upland wheat stubble and one in a bottomland hayfield. One trapline was placed in the bottomland hardwood vegetation type. Traplines consisted of 25 stations approximately 10 meters apart with four traps per station, one Sherman live trap and three snap traps. Traps were baited with peanut butter and oatmeal. Each trapline was run for four consecutive nights, except one which was inadvertently plowed under on the second day. Total trapnights were corrected by deleting sprung but empty traps. Mist nets were erected near a small pond and an abandoned homestead in unsuccessful attempts to collect bats.

Breeding birds were sampled by a modification of the Breeding Bird Survey (Robbins and Van Velzen 1967, Bystrak 1981). Three routes were surveyed in June 1981, one with 25 stops and two with 30 stops each. All birds seen or heard during a three-minute period within one-quarter mile of each stop were recorded, as well as all mammals observed at or between stops. Stops were spaced at one-half mile intervals. Breeding birds in the hardwood draw and bottomland hardwood vegetation types were surveyed by walking transects to determine species composition and relative abundance as these linear habitats were not adequately sampled by the modified BBS method.

Raptors were surveyed using standard techniques (Call 1978). Most nests were located through road or walking surveys. Nocturnal surveys using tape-recorded calls were used to document the occurrence of owls in February and March 1982.

The occurrence and relative abundance of reptiles and amphibians was determined through opportunistic sightings in conjunction with other surveys; no special collecting efforts were made for these species.

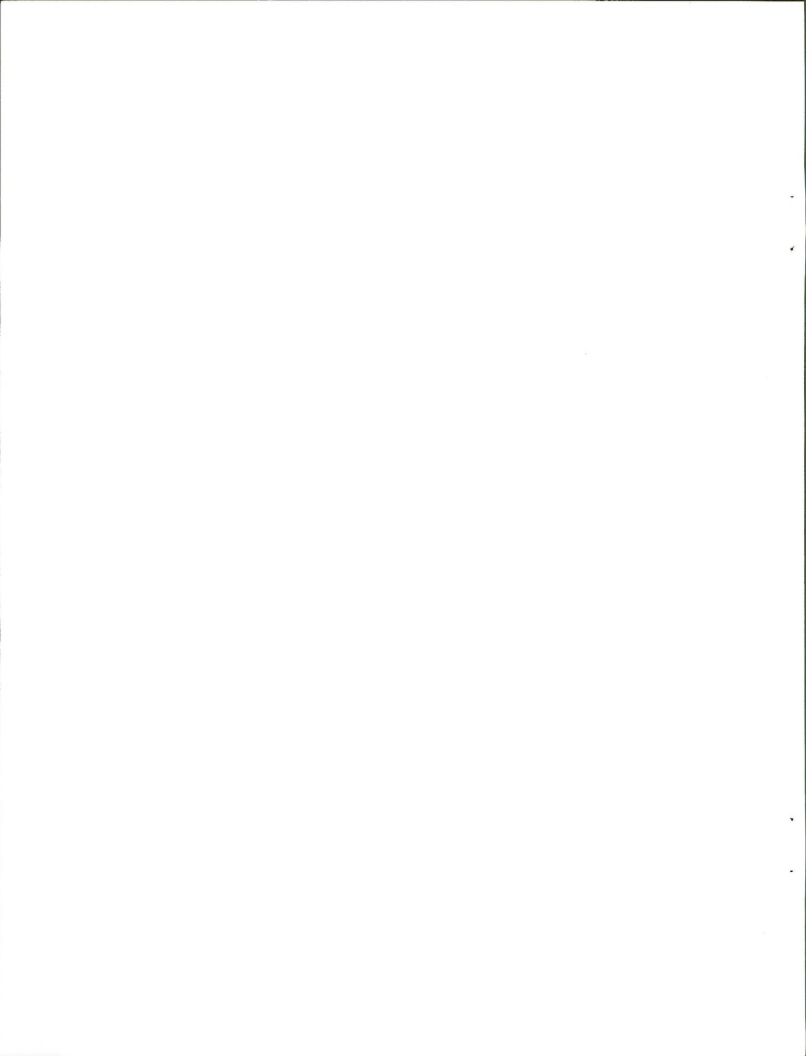
For the purpose of this report seasons are defined as follows:

Spring: March 1 — May 31

Summer: June 1 — August 31

Fall: September 1 — November 30

Winter: December 1 — February 28



# RESULTS AND DISCUSSION

## MULE DEER

### Distribution and Habitat Utilization

Mule deer observations are graphically represented in Figures 3-5. Most mule deer were observed in the rolling "breaks" topography bordering the major drainages, particularly the upper reaches of side drainages along Seven-mile, Clear and Bad Route Creeks. Group size was greatest in winter and early spring (Table 1). No distinct wintering areas were evident on the study area; areas used in winter were similar to those used in other seasons. A group of 22 mule deer observed in January south of Seven-mile Creek was the largest group noted. This group may have been associated with a low-density mule deer wintering area (2.2 deer per square mile) identified adjacent to the northeast corner of the study area (Swenson 1980).

Seasonal observations of mule deer by habitat type are presented in Table 1. Observations in grassland habitat declined by 19 percent between spring 1981 and spring 1982, while observed use of cropland increased by 25 percent during the same period. Differential sampling and weather differences between the spring periods may have accounted for some of the change in use. The spring 1981 sample period began in April, during an early, mild spring when forb greenup may have already attracted deer into grassland areas. In the

spring of 1982, the sample period terminated at the end of April, during a late spring before significant forb greenup had occurred. More deer may have been using wind-swept fields of early-greening winter wheat in March and April 1982. Observed fall use of cropland was largely the result of evening sightings of mule deer feeding in alfalfa fields adjacent to grassland and hardwood draw habitats.

A preference for hardwood draw and mesic shrub types was evident in every season. In association with rough terrain, these are key habitat types for mule deer on the Great Plains (Severson 1981). The hardwood draw and mesic shrub habitats combined, represented less than two percent of the study area, yet supported between 12 and 19 percent of observed use by mule deer. In contrast, use of cropland never exceeded the percentage of cropland on the study area (30.6%) and grassland use exceeded its percentage on the study area (68.2%) only in spring and summer 1981.

Hardwood draws appeared to be important for fawn security, as several fawns were encountered in hardwood draws in June and July. In the Missouri River Breaks, Dood (1978) found lower rates of predation on mule deer fawns in timbered than in open habitat types. Steigers (1981), in the South Dakota Badlands, found that mule deer fawns usually restricted their diurnal movements to woody draw systems and that most diurnal bedsites were in woody sites.

Table 1. Seasonal Habitat Use by Mule Deer on the Southwest Glendive Study Area, Expressed in Percent of Observations

| Habitat Type     | Percent of Study Area | Spring 1981 <sup>1</sup> (196) <sup>2</sup> | Summer 1981(66) | Fall 1981(177) | Winter 1981-82(112) | Spring 1982 <sup>3</sup> (287) |
|------------------|-----------------------|---|-----------------|----------------|---------------------|--------------------------------|
| Grassland        | 68.2                  | 79  | 71              | 61             | 65                  | 60                             |
| Sage-grassland   | 1                     | 5   | 1               | 4              |                     |                                |
| Cropland         | 30.6                  | 1   | 9               | 17             | 23                  | 26                             |
| Hardwood Draw    | 1                     | 11  | 11              | 6              | 11                  | 6                              |
| Mesic Shrub      | 1                     | 4   | 8               | 12             | 1                   | 8                              |
| Mean Group Size  |                       | 6.1   | 1.5             | 3.4            | 6.6                 | 7.4                            |
| Number of Groups |                       | 32  | 44              | 52             | 17                  | 39                             |

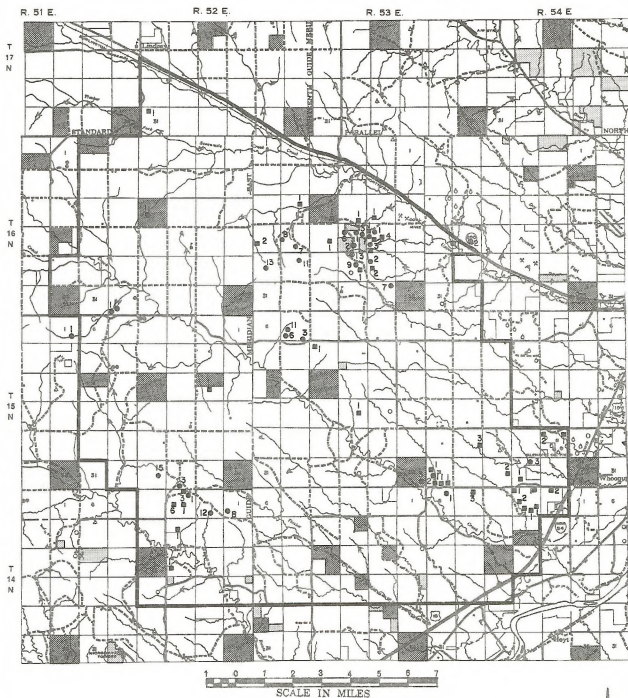
<sup>1</sup>April 7 — May 31, 1981

<sup>2</sup>Sample Size

<sup>3</sup>March 1 — April 30, 1982



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## MULE DEER OBSERVATIONS

### LEGEND

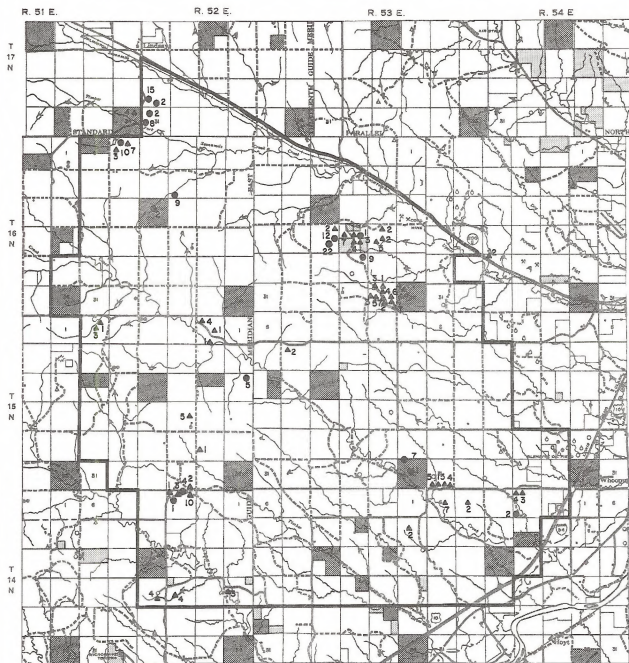


- Spring 1981 (April & May)
- Summer 1981

Numbers represent group size.



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## MULE DEER OBSERVATIONS

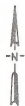
### LEGEND



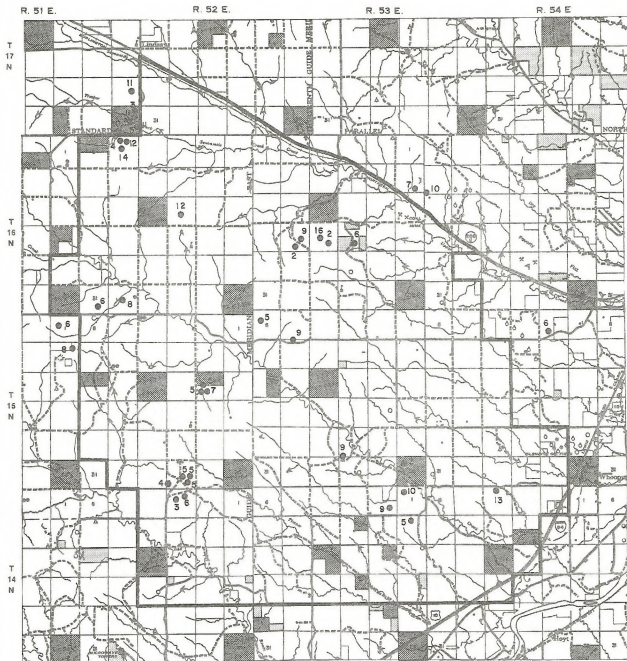
▲ Fall 1981

● Winter 1981-1982

*Numbers represent group size.*



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## MULE DEER OBSERVATIONS

### LEGEND



*Spring 1982 (March & April)*

*Numbers represent group size.*

Table 2. Deer Population Characteristics on the Southwest Glendive Study Area — September and October, 1981

| Species           | Sample Size | Percentage |         | Fawns/100 |         | Males/100 |         |
|-------------------|-------------|------------|---------|-----------|---------|-----------|---------|
|                   |             | Males      | Females | Fawns     | Females | Adults    | Females |
| Mule Deer         | 116         | 29         | 41      | 30        | 74      | 43        | 72      |
| White-tailed Deer | 249         | 20         | 40      | 40        | 100     | 66        | 51      |

Swenson (1978a, 1981) and Martin (1980) in eastern Montana and Severson and Carter (1978) in South Dakota all considered hardwood draw and upland riparian types to be the most critical habitats for mule deer on their respective study areas. Swenson (1981) based his assessment of hardwood draws on their value in providing succulent foliage during the growing season and escape cover from predators and hunters. During the hunting season, Swenson (1982) found a significant increase in mule deer use of upland timbered cover types (including hardwood draws). Considering the greater percentage of hardwood draws on the Intake area (5.5%), the relative value of this vegetation type on the study area becomes apparent. Based on these evaluations and habitat use statistics, hardwood draw and mesic shrub types are deemed critical habitats for mule deer on the Southwest Glendive Study Area.

### Population Characteristics

Results of preseason classification of mule deer on the study area are presented in Table 2. In Region 7 of the Montana Department of Fish, Wildlife and Parks (MDFWP), Swenson (1978b) estimated that mule deer could maintain stability with 30-40 percent fawns in the post-season population. Fawn production on the study area (30% fawns preseason) is probably biased downward due to the large unproductive yearling segment as reported by Youmans and Swenson (1982) from harvest data for Region 7 (21.9% yearlings in the female segment of the population in 1981;  $N=146$ ). Fawn mortality in Region 7 was negligible during the 1981-82 winter (Youmans and Swenson 1982) and the mule deer population on the study area is probably reflective of the upward trend throughout the Region.

Youmans and Swenson (1982) reported 40% fawns and 13% bucks for Region 7 ( $N=5905$ ) and 38% fawns and 19% bucks for the hunting unit encompassing the study area (Hunting District 731;  $N=293$ ) from fall 1981 classifications. The lower percentage of fawns (30%) and higher percentage of bucks (29%) on this study area may be

the result of smaller sample size ( $N=116$ ), sampling differences, or real differences related to habitat quality. Greater dispersal rates for yearling males than for yearling females (Robinette 1966, Hamlin 1982) may account for higher buck ratios, if habitat is more marginal and the population is lower on the study area than on adjacent areas. The high count, made on April 20, 1982, showed a minimum of 45 mule deer on the area.

## WHITE-TAILED DEER

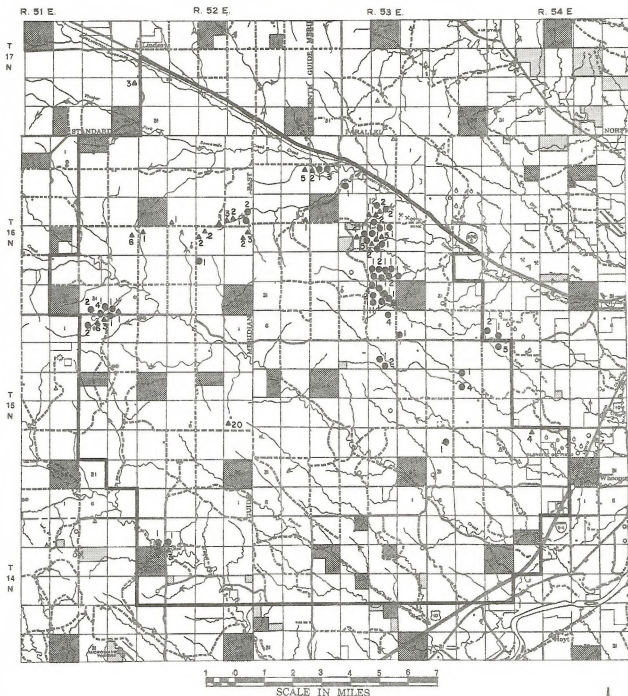
### Distribution and Habitat Utilization

White-tailed deer distribution appeared to vary somewhat between seasons, though their use of some areas remained fairly constant (Figures 6-8). The bottomlands along Bad Route Creek were used by whitetails year-round, though minor seasonal variations were apparent along upper Clear Creek and upper Sand Creek.

Winter concentrations were evident in three general locations. At least 15 whitetails were noted along Bad Route Creek, a group of 30 along upper Clear Creek just west of the study area, and a winter high of 33 along upper Sevenmile Creek southeast of Lindsay. Increased fall and winter use of the latter area may result from movement of whitetails from further up Sevenmile drainage west of the study area.

Marked variations were apparent in seasonal habitat use by white-tailed deer (Table 3). Observed grassland use was greatest in winter, then dropped to a low in early spring, while utilization of cropland was greatest in early spring 1982. This seemingly abrupt shift in use can be attributed in large part to increased use of snow-free fields of early greening winter wheat. Fall use of cropland was largely the result of observations in alfalfa. A preference for this type has been documented elsewhere for whitetails (Allen 1968, Martinka 1968, Swenson 1978a), though these authors reported a much higher and more sustained use of hayfields from spring through fall than noted on this study area.

# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## WHITE-TAILED DEER OBSERVATIONS

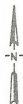
### LEGEND



▲ Spring 1981 (April & May)

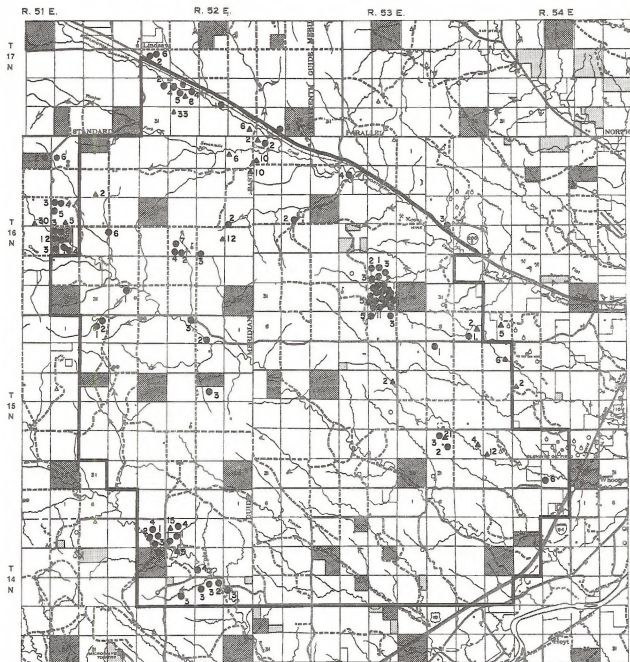
● Summer 1981

Numbers represent group size.





# SOUTHWEST GLENDAVE WILDLIFE BASELINE INVENTORY



1 2 3 4 5 6 7  
SCALE IN MILES

## WHITE-TAILED DEER OBSERVATIONS

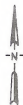
### LEGEND



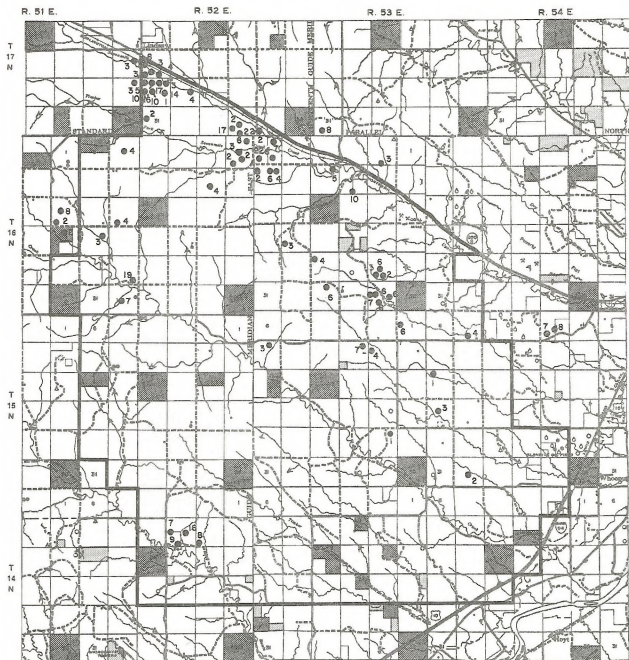
● Fall 1981

▲ Winter 1981-1982

Numbers represent group size.



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



1 0 1 2 3 4 5 6 7  
SCALE IN MILES

## WHITE-TAILED DEER OBSERVATIONS

### LEGEND



• Spring 1982 (March-April)

Numbers represent group size.

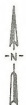




Table 3. Seasonal Habitat Use by White-tailed Deer on the Southwest Glendive Study Area, Expressed in Percent of Observations

| Habitat Type        | Percent of Study Area | Spring 1981 <sup>1</sup> (102) <sup>2</sup> | Summer 1981(89) | Fall 1981(295) | Winter 1981-82(208) | Spring 1982 <sup>3</sup> (456) |
|---------------------|-----------------------|---|-----------------|----------------|---------------------|--------------------------------|
| Grassland           | 68.2                  | 37  | 48              | 52             | 76                  | 27                             |
| Sage-grassland      | 1                     | 6   |                 | 1              | 2                   | 2                              |
| Cropland            | 30.6                  | 8   | 8               | 31             | 21                  | 61                             |
| Hardwood Draw       | 1                     | 33  | 29              | 3              |                     | 4                              |
| Mesic Shrub         | 1                     | 16  | 8               | 10             | 1                   | 5                              |
| Bottomland Hardwood | 1                     |   | 7               | 3              |                     | 1                              |
| Mean Group Size     |                       | 3.6   | 1.8             | 3.4            | 9.0                 | 6.2                            |
| Number of Groups    |                       | 28  | 50              | 88             | 23                  | 74                             |

<sup>1</sup>April 7 — May 31, 1981

<sup>2</sup>Sample Size

<sup>3</sup>March 1 — April 30, 1982

Woody types were preferred in spring and summer 1981, comprising nearly half of observed use during that period. The use of those cover types for fawning and rearing may be especially important during this period. In winter and early spring 1982, use of woody types was unaccountably low, though many observations in cropland or grassland were near woody types. Whitetails often retreated into the bottomland hardwoods along Bad Route Creek when first observed in adjacent fields. Woody types, especially hardwood draws, are deemed critical habitats due to their scarcity and high use factors by whitetails in spring and summer.

## Population Characteristics

Results of preseason classifications of white-tailed deer are presented in Table 2. Productivity was greater than that of mule deer, though similar to that reported for whitetails in Region 7 (Youmans and Swenson 1982). A large segment of unproductive yearling does and high overwinter fawn survival was also indicated for whitetails in Region 7 in 1981-82 (Youmans and Swenson 1982). The high count, made in February, showed a minimum of 86 whitetails on the study area.

## PRONGHORN ANTELOPE

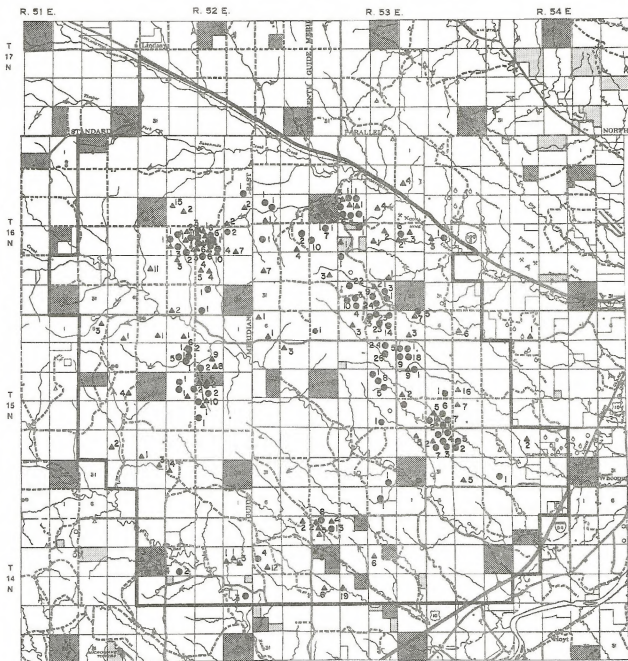
### Distribution and Habitat Utilization

Antelope were widely distributed on the study

area in the summer, becoming more consolidated in the winter (Figures 9-11). Winter concentrations were evident in the upper Whoopup Creek-lower Clear Creek areas (44), the Sand Creek area (74), near the center of the study area (96), and in the Sevenmile drainage just north of the study area (133). Movements probably involved minor shifts from summer to winter range, as well as longer movements from west of the study area. Breakup of winter groups and dispersal from wintering areas occurred in mid-April 1982; winter herd breakup appeared to be somewhat earlier in 1981, perhaps in response to milder winter-spring weather.

Of the three habitat types used by pronghorn on the study area (Table 4), use of the limited sagebrush-grassland type was significant only in late spring 1981. Grassland use peaked in summer and dropped abruptly in fall as use of cropland increased. Fall cropland use may be attributed to a fall preference by antelope for sprouted grain, as indicated by Cole and Wilkins (1958) in west central Montana. Cropland use remained high through the winter and early spring. This may be accounted for by the scarcity of sagebrush on the area, a preferred winter food and cover, and the suggestion of Cole and Wilkins (1958) that wheat may be substituted for sagebrush in the winter-early spring diet of antelope. Hepworth (1970) also reported use of wheat during winter in Nebraska where browse was not available. However, on a predominantly sagebrush-grassland range in east central Montana, Bayless (1969) considered cropland of little importance.

# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



1 0 1 2 3 4 5 6 7  
SCALE IN MILES

## PRONGHORN ANTELOPE OBSERVATIONS

### LEGEND

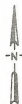
BLM

State

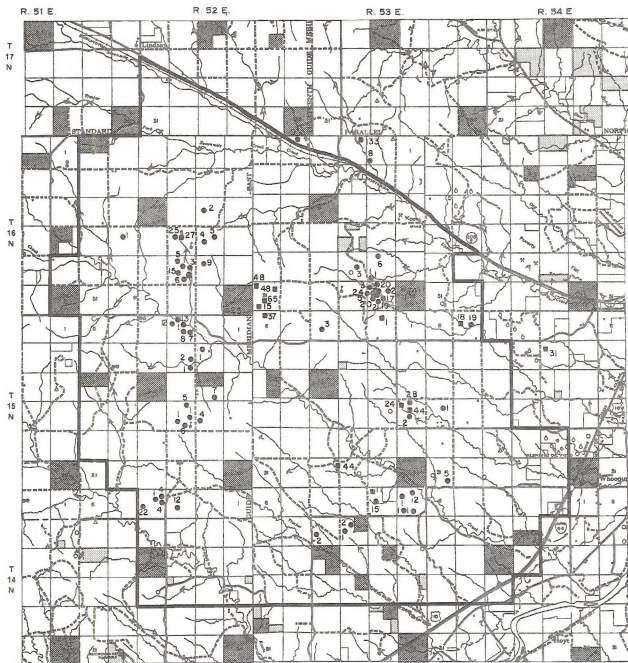
▲ Spring 1981 (April-May)

● Summer 1981

*Numbers represent group size.*



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



1 0 1 2 3 4 5 6 7  
SCALE IN MILES

## PRONGHORN ANTELOPE OBSERVATIONS

### LEGEND

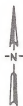
BLM

State

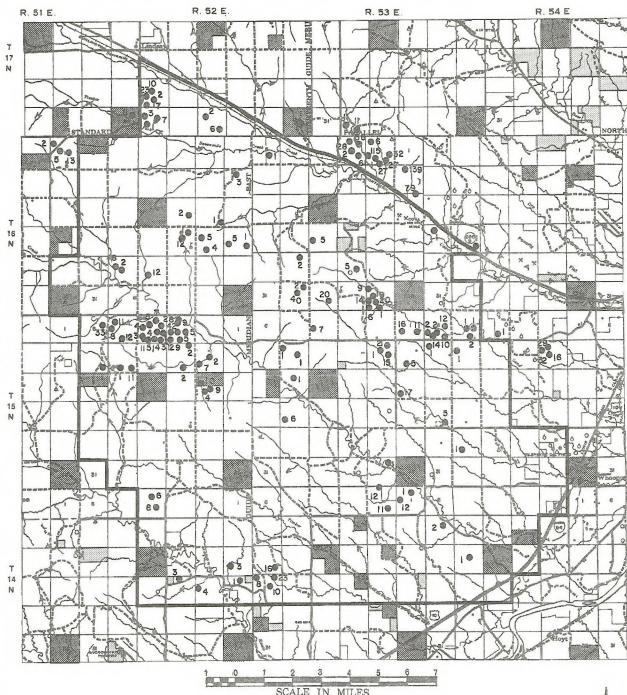
● Fall 1981

■ Winter 1981-1982

Numbers represent group size.



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## PRONGHORN ANTELOPE OBSERVATIONS

### LEGEND

BLM

State

Spring 1982 (March & April)

Numbers represent group size.

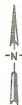




Table 4. Seasonal Habitat Use by Pronghorn Antelope on the Southwest Glendive Study Area, Expressed in Percent of Observations

| Habitat Type     | Percent of Study Area | Spring 1981 <sup>1</sup> (394) <sup>2</sup> | Summer 1981(457) | Fall 1981(636) | Winter 1981-82(642) | Spring 1982 <sup>3</sup> (1513) |
|------------------|-----------------------|---|------------------|----------------|---------------------|---------------------------------|
| Grassland        | 68.2                  | 67  | 76               | 35             | 36                  | 28                              |
| Sage-grassland   | 1                     | 8   | 1                |                |                     | 1                               |
| Cropland         | 30.6                  | 25  | 23               | 65             | 64                  | 71                              |
| Mean Group Size  |                       | 4.1   | 4.7              | 8.4            | 40.1                | 10.8                            |
| Number of Groups |                       | 97  | 97               | 76             | 16                  | 140                             |

<sup>1</sup>April 7 — May 31, 1981

<sup>2</sup>Sample Size

<sup>3</sup>March 1 — April 30, 1982

Cropland use declined precipitously in April, as winter groups dispersed and apparently as forb greenup attracted more antelope into the grasslands. Before April 15 (1982), only 21% of spring observations were in grasslands; by late April, 68% of observations were in the grassland type.

## Population Characteristics

Results of summer and fall classifications of pronghorn antelope are presented in Table 5. Production on the study area was excellent in summer 1981, based on the following ratings proposed by Trueblood (1971): 40-59 fawns/100 does, poor; 60-79/100, fair; 80-99/100, good; and 100+/100, excellent. Complete aerial surveys conducted by the Montana Department of Fish, Wildlife and Parks (MDFWP) on 13 of the 33 hunting units in Region 7 in July 1981 resulted in a regionwide average of 94 fawns/100 does and ranged from 54 to 103 fawns/100 does (Dood 1982). Complete aerial surveys were not made of the hunting unit encompassing the

study area in 1981. The nearest unit surveyed, directly north of the study area (HD732), exhibited 91 fawns/100 does.

The increase in the male/female ratio from summer to fall may be accounted for by behavioral manifestations of bucks at the onset of the rut, i.e. bucks become more active and thus more readily observable in September. The decline in the fawn/doe ratio is less readily explained. Perhaps a combination of factors may account for this change, including a decline in the activity and observability of fawns following a mid-summer peak of activity (Autenrieth 1978). Additional factors may include predation of fawns, movement of a more productive segment of the population from the area (or conversely, movement of a less productive segment onto the area), or differential sampling, i.e. sampling of different segments of the population in each sampling period. Lack of complete aerial survey data for the study area in 1981 precludes further analysis of the available data.

Table 5. Population Characteristics of Pronghorn Antelope On the Southwest Glendive Study Area in 1981

| Season            | Sample Size | Percentage |         | Fawns | Fawns/100 |                   |
|-------------------|-------------|------------|---------|-------|-----------|-------------------|
|                   |             | Males      | Females |       | Females   | Males/100 Females |
| Summer (July-Aug) | 222         | 11         | 42      | 47    | 111       | 26                |
| Fall (September)  | 141         | 30         | 42      | 28    | 65        | 70                |

Table 6. Pronghorn Antelope Population Characteristics and Trends on the Southwest Glendive Study Area<sup>1</sup>

| Year Surveyed | Total Counted on Study Area | Percentage |         |       | Fawns/100 Males/100 Females |         |
|---------------|-----------------------------|------------|---------|-------|-----------------------------|---------|
|               |                             | Males      | Females | Fawns | Females                     | Females |
| 1975          | 344                         | 18         | 42      | 40    | 94                          | 42      |
| 1978          | 249                         | 26         | 46      | 28    | 60                          | 55      |
| 1979          | 150                         | 8          | 49      | 43    | 87                          | 16      |
| 1982          | 263                         | 24         | 51      | 25    | 50                          | 47      |

<sup>1</sup>Information derived from unpublished data on complete aerial survey maps for Region 7, Montana, Fish, Wildlife and Parks Department; surveys flown in July and August.

Population data presented in Table 6 were extracted from complete aerial surveys for the study area in years when the hunting unit encompassing the study area was surveyed by the Montana Fish, Wildlife and Parks Department. Antelope population trends on the study area paralleled regionwide trends, with an increase in the early 1980's following a decline through the late 1970's. Antelope numbers on the study area in July 1981 were probably between 150 and 263 animals, as the population trend was increasing. The high winter count was 143 on January 21, while 96 were noted on February 26, with an additional 164 immediately adjacent to the study area on that date. However, the purpose of Table 6 is to demonstrate the dynamic nature of the antelope population, the annual variation in numbers, productivity and sex ratio, and the need to consider trend as well as absolute numbers in population analysis.

## SHARP-TAILED GROUSE

### Distribution and Habitat Utilization

Fall and winter distribution of sharp-tailed grouse (Figure 12) was primarily along drainages or in rough topography, usually in close proximity to woody vegetation. Sharptails appeared to be more abundant on the north half of the study area, with 60 percent more fall and winter observations on the north half than on

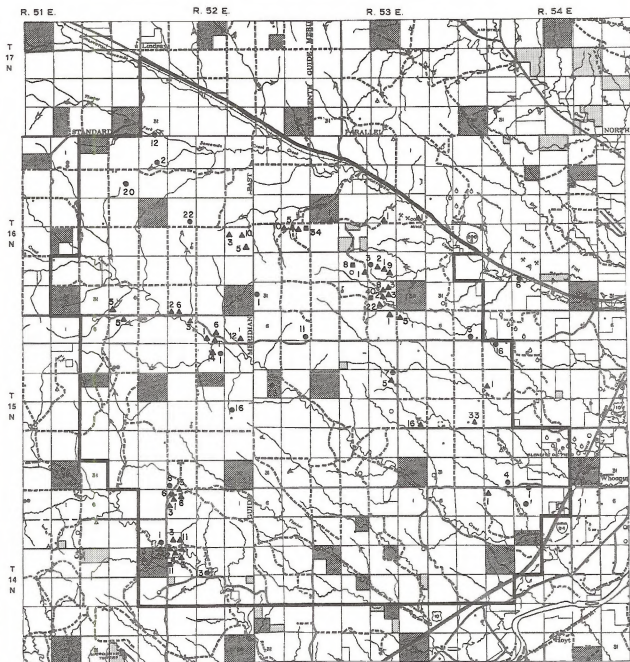
the south half. Distribution of display grounds and brood observations are presented in Figure 13. Most display grounds were along drainages or on uplands at the heads of drainages, and at least 77 percent were within one-half mile of woody cover, often buffaloberry clumps. Seven of the eight broods were observed within one mile of known display grounds.

Selection for grassland, where observed use exceeded the percentage of grassland on the study area, occurred only in summer; cropland use was negligible during this period (Table 7). Use of cropland exceeded its percentage on the study area only in winter, when grassland use was at its lowest. This was apparently the result of a food habit shift from summer use of forbs to use of grain in winter. Woody habitat types were preferred in all seasons with the mesic shrub type receiving the greatest use of all habitats in winter. Buffaloberry and Russian olive, major components of the mesic shrub type, were preferred winter foods of sharp-tailed grouse in a nutritional study by Evans and Dietz (1974), who also found that buffaloberry was the best native food tested.

The shift between spring and summer from mesic shrub to hardwood draw use may be accounted for by the summer preference of sharptails for sites with dense canopies for shade and cover (Yde 1977). In late summer, sharptails were noted feeding on seeds in ash trees in hardwood draws. Utilization of woody types shifted back to mesic shrubs in fall and remained high in this type into early spring.



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## SHARP-TAILED GROUSE OBSERVATIONS

### LEGEND

BLM

State

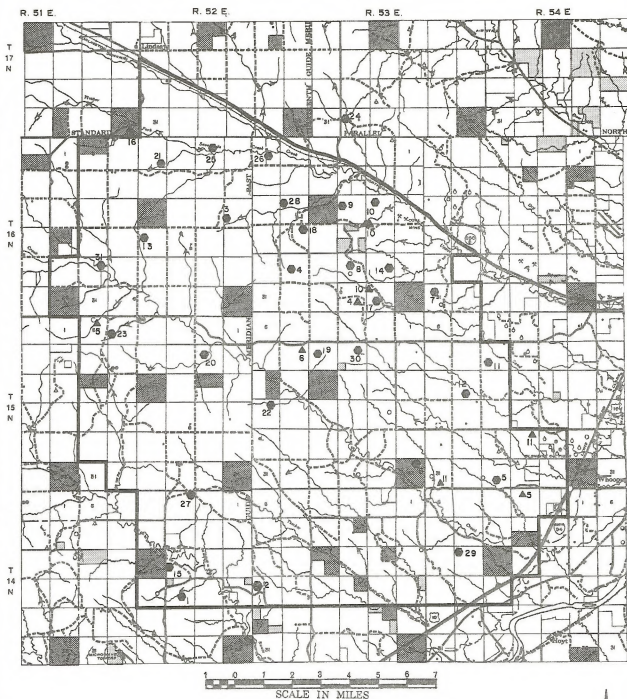
▲ = fall observation

● = winter observation

■ = active display ground

Numbers represent group size.

# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## SHARP-TAILED GROUSE DISPLAY GROUNDS AND BROOD OBSERVATIONS

### LEGEND



- = display ground location  
(numbered in sequence of discovery)
- ▲ = brood location  
(number indicates total group size)

Table 7. Seasonal Habitat Use by Sharp-tailed Grouse on the Southwest Glendive Study Area, Expressed in Percent of Observations

| Habitat Type        | Percent of Study Area | Spring 1981 <sup>1</sup> (51) <sup>2</sup> | Summer 1981(175) | Fall 1981(265) | Winter 1981-82(329) | Spring 1982 <sup>3</sup> (81) |
|---------------------|-----------------------|--|------------------|----------------|---------------------|-------------------------------|
| Grassland           | 68.2                  | 49   | 75               | 48             | 16                  | 53                            |
| Sage-Grassland      | 1                     | 2  |                  | 2              |                     | 1                             |
| Cropland            | 30.6                  | 2  | 1                | 25             | 41                  | 10                            |
| Hardwood Draw       | 1                     | 4  | 23               | 6              |                     | 5                             |
| Mesic Shrub         | 1                     | 41   | 1                | 17             | 42                  | 30                            |
| Bottomland Hardwood | 1                     |  |                  | 2              | 1                   | 1                             |

<sup>1</sup>Excluding birds on display grounds

<sup>2</sup>Sample size

Table 8. Sharp-Tailed Grouse Display Grounds on the Southwest Glendive Study Area 1982

| No. | Location                | Maximum Count of Lekking Males | Date of Maximum Count |
|-----|-------------------------|--------------------------------|-----------------------|
| 1   | T14N, R52E Sec. 22 NWSE | 14                             | 20 April              |
| 2   | T14N, R53E Sec. 19 NWSW | 8                              | 20 April              |
| 3   | T16N, R52E Sec. 13 SWSW | 10                             | 21 April              |
| 4   | T16N, R53E Sec. 29 NESW | active-no count <sup>1</sup>   |                       |
| 5   | T15N, R54E Sec. 33 SWSE | 18                             | 23 April              |
| 6   | T15N, R53E Sec. 36 NENE | 12                             | 28 April (PM)         |
| 7   | T16N, R54E Sec. 31 SENW | 11                             | 23 April              |
| 8   | T16N, R53E Sec. 27 SENW | 8                              | 21 April              |
| 9   | T16N, R53E Sec. 15 SWNW | active-no count <sup>1</sup>   |                       |
| 10  | T16N, R53E Sec. 14 SENW | 16                             | 28 April              |
| 11  | T15N, R54E Sec. 9 NESW  | 18                             | 23 April              |
| 12  | T15N, R54E Sec. 17 SWSE | active-no count <sup>1</sup>   |                       |
| 13  | T16N, R52E Sec. 21 SWNW | 12                             | 21 April              |
| 14  | T16N, R53E Sec. 26 SENE | active-no count <sup>1</sup>   |                       |
| 15  | T14N, R52E Sec. 15 SWSW | 10                             | 20 April              |
| 16  | T17N, R51E Sec. 36 SWSE | 6                              | 25 April              |
| 17  | T16N, R53E Sec. 35 SWNW | 26                             | 22 April              |
| 18  | T16N, R53E Sec. 20 NENE | 8                              | 21 April              |
| 19  | T15N, R53E Sec. 9 SENW  | 12                             | 13 April              |
| 20  | T15N, R52E Sec. 11 SENW | 10                             | 24 April              |
| 21  | T16N, R52E Sec. 3 SWSW  | 11                             | 1 April               |
| 22  | T15N, R53E Sec. 20 NENW | 26                             | 13 April              |
| 23  | T15N, R52E Sec. 5 NWSW  | 6                              | 14 April              |
| 24  | T17N, R53E Sec. 32 NESW | 9                              | 15 April              |
| 25  | T16N, R52E Sec. 2 NWSE  | 9                              | 16 April              |
| 26  | T16N, R53E Sec. 6 NWSE  | 20                             | 16 April              |
| 27  | T14N, R52E Sec. 3 NENE  | 4                              | 20 April              |
| 28  | T16N, R53E Sec. 17 SWNW | 6                              | 21 April              |
| 29  | T14N, R54E Sec. 17 SWNW | 12                             | 22 April (PM)         |
| 30  | T15N, R53E Sec. 10 SENE | 1 <sup>2</sup>                 | 29 April (PM)         |
| 31  | T16N, R52E Sec. 30 SENE | 18                             | 30 April              |

<sup>1</sup>Display grounds located in 1981 but not visited in 1982 although they were determined to be active from the sounds of lekking males

<sup>2</sup>"Several" grouse reported by landowner on previous occasions

## Population Characteristics

Thirty-one sharptail display grounds were located on the study area, (Figure 13 and Table 8) with 18 discovered in 1981 and the remaining 13 in early spring 1982. Observations suggested additional grounds, though time and access prevented confirmation. Thus, the total number of display grounds and any resulting population estimates are minimal.

Data on sharp-tailed grouse display grounds are presented in Table 8. Maximum counts of displaying males totalled 321 in spring 1982 and averaged 11.9 per active display ground. Average male attendance at grounds in 1982 was similar to that reported by Knapp and Hildebrand (1982) for Region 7 (11.5). The Region 7 average was up 15 percent from the 1981 regional average, though down from the 1976-1981 average of 12.5 (Knapp and Swenson 1980, Knapp and Hildebrand 1982).

Renesting was suggested by observations in June and July of displaying males and probable females on display grounds. Production was apparently average. Eight broods of from 3 to 10 young were observed between July 9 and August 6, with an average of 6.75 young/brood. This was below the Region 7 average of 8.6 young/brood for 1981 (Knapp and Hildebrand 1982) but similar to the long-term average for the region.

## RING-NECKED PHEASANT

### Distribution and Habitat Utilization

The majority of pheasant observations (67%) were along the three major drainages, nearly one-third in the Bad Route Creek area. Pheasants were locally common in brushy areas and near shelterbelts along lesser drainages. All but 15 of 136 pheasant observations recorded on the study area were during the spring and summer breeding and brood-rearing periods. No fall or winter concentration areas were identified. This may have been the combined result of decreased pheasant activity, less time on the study area (Appendix A), and limited survey coverage of inhabited areas such as around farm and ranch buildings, where pheasants may have concentrated in winter. Reports from landowners indicated small groups of pheasants wintered near farmsteads.

The mesic shrub type was the habitat most selected by pheasants in every season, comprising 34 percent of observed use for the survey period. Woody habitats combined supported 54 percent of recorded use. Cropland use averaged five percent during the study period.

## Population Characteristics

An assessment of reproductive success was limited by small sample size. Only four broods were noted. The largest brood of ten young was observed June 18 along Bad Route Creek. Average brood size was similar to the 8.8 reported for Region 7 (Knapp and Hildebrand 1982).

In May 1981, a pheasant crowing route was surveyed using standard procedures (Gates 1966). This route, in the southern half of the study area, terminated along the Bad Route Creek drainage. Only six crows were recorded for the entire route, though cloudy conditions may have affected results. No more than this number were recorded on any one day during the spring 1981 period for the entire study area, indicating a relatively low population. In spring 1982, harem activity was initially noted in mid-March and a high count of seven crows was recorded on the morning of April 30 from Lindsay to Bad Route Creek. The marginal nature of pheasant habitat on the study area can be demonstrated by comparison to crowing routes run by the Montana DFWP in Region 7. Rarely do these routes obtain less than six crows *per stop* and one route along the Yellowstone River northeast of the study area recorded an average of 24.2 crows *per stop* in spring 1981 (Knapp, et al 1981). Density bias as reported by Gates (1966) may have exaggerated these differences somewhat.

## HUNGARIAN PARTRIDGE

Huns were locally common near grainfields and farmsteads, primarily on the north and east sides of the study area. Nearly 75 percent of observations were within one mile of a farm-house. Only 30 observations of 144 individual Hungarian partridge were recorded during this study, in three habitat types. Most observations were in grasslands (57%), followed by cropland (24%) and the mesic shrub type (19%). This overall habitat preference was reversed during both spring periods when most observations were in mesic shrubs. Group size varied from a low of 1.8 in spring 1981 (n=7) to a high of 7.3 during fall (n=51), reflecting breeding behavior and recruitment to the population.



## SAGE GROUSE AND TURKEY

No sage grouse were noted during the survey period. However, landowners in the Bad Route Creek area reported seeing occasional "sage hens" in previous years, including one displaying male among sharp-tailed grouse on display ground number one (Figure 13). The nearest known sage grouse display grounds are about twelve miles southwest of the study area (BLM and MDFWP file data). Two tom turkeys were reported by landowners in April 1981 in the Bad Route Creek area.

## WATERFOWL

Eighteen species of waterfowl were observed on the study area (Table 9). Waterfowl use was monitored on a large reservoir on Sevenmile Creek and on several smaller stockponds, though ducks were occasionally observed on pools in streams.

The mallard was the predominant species in all seasons except winter, comprising 36 percent of summer observations and from 47 to 72 percent of spring and fall observations of waterfowl. Following the mallard in decreasing order of abundance were blue-winged teal, wigeon and Canada goose in late spring 1981, green-winged teal, lesser scaup and Canada goose in fall, and, in early spring 1982, green-winged teal, pintail, wigeon and shoveler. Only two mallards and about 100 migrating Canada geese were seen on the study area during the winter period.

Eleven species of waterfowl were noted during the summer period, with the blue-winged teal, gadwall and wigeon following the mallard in frequency of observation.

A mallard nest with seven eggs was found on May 6 at the large reservoir on Sevenmile Creek and four mallard broods were recorded from June 9 to August 5 on stockponds and streams. Broods of gadwall, blue-winged teal and wigeon were also observed on stockponds and stream pools in late June and early July. Three additional duck species were suspected of nesting on the study area and eight were considered migrants only (Table 9). One Canada goose brood of at least three was observed on May 20 on the large reservoir on Sevenmile Creek. No geese were seen on any other ponds.

## FURBEARERS AND PREDATORS

The relative abundance and total recorded observations of furbearers and predators are found in Table 10. Seasonal habitat use for these species is presented in Appendices B through F. Of those species classed as fur-bearing animals by the Montana DFWP, only the beaver and mink were observed on the study area. One beaver was observed in the large reservoir on Sevenmile Creek. The landowner reported that five beaver were trapped there in 1980. Muskrats probably occur along Sevenmile Creek, though none were observed during the survey. The two observations of mink were probably of the same individual, along Bad Route Creek. Undoubtedly more were present and observations were limited by survey techniques. No bobcats were noted on the study area; the nearest known bobcat was trapped about six miles west of the south west corner of the study area in 1979-80 (Knapp, et al 1981).

Coyotes were the most common predator on the study area, though they did not appear to be abundant. Most observations were in the "rougher" breaks areas in the northeast and southwest corners (Bad Route Creek area) and along Clear Creek. Two local trappers removed about 23 coyotes from the study area during the 1981-82 trapping season. Both trappers felt the coyote population was down from recent years.

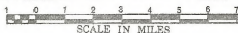
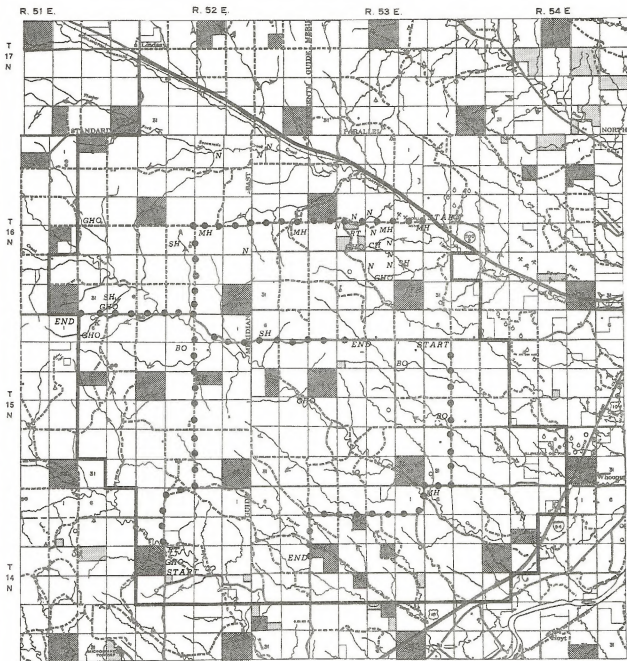
Red foxes were observed at four locations on the north and east sides of the area. One den site with six pups and another family of three pups were noted on the east side of the study area. Approximately ten foxes, plus eight badgers and 20 skunks were trapped on the area. Raccoons were found in hardwood draws, the bottomland hardwoods and marshy areas. This population was also perceived by the trappers to be down from recent years.

## RAPTORS

Eighteen species of raptors were identified on the study area and one additional species was seen adjacent to the area (Table 9). Location of raptor nests on the area are presented in Figure 14. Appendix G summarizes raptor nest information. More detailed species accounts follow.



# SOUTHWEST GLENDIVE WILDLIFE BASELINE INVENTORY



## RAPTOR NEST LOCATIONS

### LEGEND



BLM



State

N = Inactive nest

CH = Cooper's Hawk

MH = Marsh Hawk

RT = Red-tailed Hawk

SH = Swainson's Hawk

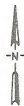
FH = Ferruginous Hawk

K = Kestrel

GHO = Great-horned Owl

BO = Burrowing Owl

• • • • • Breeding Bird Survey Routes



1981-1982

Turkey vultures were occasionally observed soaring over the east side of the area in spring and summer. These single birds or pairs were probably associated with the badlands complex in the Makoshika State Park area across the Yellowstone River east of the study area. No evidence of nesting was found.

Sharp-shinned hawks were noted only during migration. Most were observed in or near woody habitats, typically perched in a tree or pursuing small birds in hardwood draws or shelterbelts. Breeding on the area was unlikely due to the absence of summer observations.

The Cooper's hawk, a "species of special concern" for Montana (Flath 1981a), was known to nest on the area. The nest, in a green ash in a hardwood draw, was partially damaged in a summer storm. However, one young was fledged from the nest in mid-August, a late fledging date for eastern Montana (Allen 1979). Additional suitable nesting habitat was suggested by the presence of similar inactive stick nests in adjacent hardwood draws.

Red-tailed hawks comprised about 15 percent of raptor observations in June and July, following only marsh hawks in frequency of observations. Two nests were located, both in cottonwood trees. Redtails were most frequently observed in or adjacent to these bottomland hardwood or hardwood draw nest sites. This species was first noted on the area in mid-March (1982), with the migration peak occurring in April. Most redtails left the area by early October.

Swainson's hawks were common in migration, appearing in spring about one month later than redtails and ferruginous hawks. Five active nests were located, though Swainson's hawks were less conspicuous than redtails in June and July, comprising only seven percent of raptor observations for that period. Nests were in isolated cottonwood clumps or hardwood draws and most observations were in open habitats.

The rough-legged hawk was observed infrequently on the area from October through April, though none were noted in January or February. This may have been the result of less frequent survey coverage and/or movement of roughlegs from the area. Previous wildlife inventories in eastern Montana reported the roughleg as a rare to uncommon winter resident (Matthews 1978, Swenson 1978a, Dood 1980). All observations of rough-legged hawks on the study area were in the grassland or cropland habitat types where they were typically seen hover-hunting or still-hunting from power poles or fenceposts.

One ferruginous hawk nest was located on a pinnacle of scoria in a badlands-grassland complex in the northeastern part of the area. This species was rarely seen in summer, with two of the three summer observations associated with the active nest. However, spring observations suggested the possibility of two additional nest sites, though these birds were probable migrants or non-breeders. Most observations were in grassland and cropland habitats. The ferruginous hawk is also a "species of special concern" for Montana.

The golden eagle, another "species of special concern" was an uncommon year-round resident. Most were observed during the spring and fall periods (75 percent) and of 10 noted in summer, seven were subadults. No active nests were found though two inactive nests on scoria buttes in the northeastern part of the area may have been used by eagles in prior years. Several spring and summer observations were made in the vicinity of these nests, including two of adult golden eagles.

The bald eagle, a "species of special concern" for Montana, was noted only in spring and fall.

The marsh hawk was the most common breeding raptor on the area, comprising 45 percent of raptor observations for June and July. Marsh hawks first appeared on the area in March, with the peak of migration in mid-to-late April. Nesting began in May and the peak of fledging was in mid-July. Most marsh hawks left the area by about mid-October. Though most observations were of individuals coursing over grassland or cropland, the low mesic shrub type received a disproportionate amount of use for hunting and nesting. All five active nests were discovered in rose-snowberry clumps in grassland areas. Observations indicated a minimum of 20 territorial pairs on the area.

One osprey was seen during the survey about three miles south of the study area. This bird, noted on May 8, was within about three miles of the Yellowstone River. The osprey is also a "species of special concern."

The prairie falcon was noted on the study area year-round, though only three observations were made in the summer. The lack of suitable cliff nesting habitat was the probable limiting factor on the area. Marginal nesting habitat may have existed in the southwestern part of the area for this "species of special concern" for Montana. One sighting in July was made in this area.

The peregrine falcon, a federal endangered species, was sighted on three occasions on the study

area. All were probable migrant or dispersing birds.

The merlin was considered an uncommon migrant. However, sightings of this "species of special concern" in early August were intriguing. One bird noted in August may have been an immature, raising the possibility of nesting on or adjacent to the area.

The kestrel was the second most commonly observed raptor during spring and fall, though it was less common in summer, representing only eight percent of June-July raptor observations. One nest was located in a cottonwood cavity in a hardwood draw. Most kestrels were observed perched or hunting in grassland or cropland habitats, often near woody types. Nesting on the area may have been limited by a lack of suitable cavity nest sites and woody habitat.

Seven great-horned owl nests were located, rather widely distributed on the area (Figure 14). Nocturnal bird surveys and observations suggested as many as five or six additional nesting pairs. Nests were in a variety of locations (Appendix G). Nest number two, in a cavity in a sandstone cliff along a hardwood draw, was active both years. At least two young fledged there in May 1981 and 3 nestlings were evident in April 1982. All other nests were in trees in hardwood draws, bottomland hardwoods, and shelterbelts. The nest on Bad Route Creek (nest number three), active in 1982, was utilized by a pair of red-tailed hawks in 1981.

The burrowing owl was the only owl "species of special concern" for Montana occurring on the area. Three burrow nests were identified in grassland habitat (Figure 14), fledging an average of six young per nest (Appendix G). Spring observations suggested at least two additional nest locations or potential nest sites.

Six long-eared owls were noted on the area. Most were probable migrants. However, two birds in a hardwood draw in early April 1982 may have represented a nesting pair, though no nest was located.

Short-eared owls were relatively common in grassland and cropland areas. Observations of pairs and courtship behavior indicated nesting on the area. Though no nests were located, as many as five nesting pairs were suspected in 1981. Nests were probably in grassy swales and marshy sites. An increase in observations in early spring 1982 may have reflected more favorable moisture conditions and higher rodent populations.

## BIRDS

The status, relative abundance and dates of observation for the 167 species of birds identified on the study area are presented in Table 9. Seasonal habitat use is presented in Appendices H through L and results of the modified Breeding Bird Survey are in Appendix M. The only federally endangered species observed on the area, the bald eagle and peregrine falcon, were discussed in the previous section. The following discussion is of birds found on the area that are "species of special concern" to Montana (Flath 1981a) and/or migratory birds of high federal interest.

One white pelican was seen each spring on the large reservoir on Sevenmile Creek and occasional summer observations of flying birds were of probable non-breeders. The double-crested cormorant was fairly common in migration with no evidence of nesting. Sandhill cranes were noted only in migration, usually in flight over the area. One flock was observed in a fallow field and may have roosted on the area overnight, though there was no evidence of any major use of the area for feeding or roosting. Only four long-billed curlews were noted, all in spring migration, and no evidence of nesting was apparent. The upland sandpiper was an uncommon summer resident and probable breeder; a minimum of three breeding pairs was suspected.

All observations of Sprague's pipits were in grasslands where they were considered an uncommon summer resident and probable breeder. About seven territorial pairs were evident. The loggerhead shrike was a common breeding bird. Most observations were in or near mesic shrub habitats, especially buffaloberry clumps. Observations suggested as many as 18 breeding pairs. Recently fledged young were noted in nine locations in early July, with an average of at least 2.9 fledged young per pair. Porter, et al (1970) found an average of 5.4 fledged per successful nest in a Colorado study over four years. The loggerhead shrike was first noted in mid-April, shortly after the last observation of the congeneric northern shrike. The loggerhead shrike was last observed on the area in mid-September.

The yellow-rumped warbler was an uncommon migrant; most were seen in September. All sightings were in woody habitats, most in hardwood draws. The bobolink was uncommon on the area from mid-May through June. Sightings were in upland grasslands or marshy areas along drainages. Breeding was suspected at two

or three locations and may have been disrupted by grazing or haying activities, though secretiveness at the time of fledging may have accounted for the lack of observations beyond June.

The clay-colored sparrow was fairly common in migration, an uncommon summer resident and a probable breeder. Most observations were in woody habitats or sagebrush-grasslands. The Brewer's sparrow was rare to uncommon in spring and summer. Breeding may have occurred on the area with the majority of sightings in sagebrush-grassland. The lack of sagebrush may limit the occurrence of this species on the area as the Brewer's sparrow is often considered an obligate of the sagebrush habitat (Wilson Ornith. Soc. Conser. Comm. 1976). The field sparrow was an uncommon migrant and breeder, found most often along the margins of woody areas. An adult field sparrow was observed feeding two begging cowbird fledglings in early July. The McCown's longspur was seen only once, during spring migration. Skaar (1980) indicates circumstantial evidence of breeding by this species for the study area.

## Habitat Utilization by Birds

### Grassland

Thirty-seven bird species were recorded in the grassland habitat type on the modified Breeding Bird Survey (BBS), with the horned lark comprising nearly 26 percent of observations. Following the horned lark in decreasing order of abundance were the meadowlark, chestnut-collared longspur, lark bunting, mourning dove and grasshopper sparrow. The first four species comprised over 75 percent of the birds recorded. Thus, in this most extensive habitat, a few species made up the bulk of birds noted, indicating low breeding bird diversity. During the winter, the horned lark was again the dominant species, followed in frequency of occurrence by the common redpoll, snow bunting, sharp-tailed grouse and gray partridge. A total of 72 species was noted in grasslands year-round, representing about 44 percent of bird species found on the study area.

### Sagebrush-grassland

Only ten species were recorded in this habitat on the modified BBS. The meadowlark was most abundant, comprising 58 percent of birds noted, followed in decreasing order of abundance by the lark bunting, mourning dove, vesper sparrow and Brewer's sparrow. The horned lark was the only bird observed in the sagebrush-

grassland type in winter. Thirty-five species were associated with this habitat during the inventory period, representing about 21 percent of all species observed.

### Cropland

The most abundant species in cropland on the modified BBS was the horned lark, forming 60 percent of the 15 species recorded. The meadowlark, lark bunting and chestnut-collared longspur followed the horned lark in abundance, with these four species comprising over 90 percent of the birds noted in cropland. Only six bird species were noted in cropland during the winter with the snow bunting most abundant, followed by the horned lark, sharp-tailed grouse and common redpoll. The greatest number of individual birds observed in winter was in cropland, due to the presence of several large flocks of snow buntings and horned larks. Forty-eight species were found in cropland through the inventory period, 29 percent of those recorded for the entire study area.

### Mesic Shrub

Twenty-one species were recorded in this habitat on the modified BBS. This species total was second only to that of the grassland type and represented 37 percent of all species recorded on the survey. The red-winged blackbird was the most abundant breeding bird, comprising about 30 percent of the birds noted in mesic shrubs. The eastern kingbird, meadowlark and mourning dove followed the redwing in frequency of occurrence. These four species comprised about 59 percent of the birds observed in this habitat. Ten species were found in this type during winter surveys, with the sharp-tailed grouse most often encountered, followed by the common redpoll and magpie. Thirty-one species were associated with the mesic shrub habitat during June surveys and 74 species for the entire survey period, representing about 45 percent of all species seen on the study area.

### Hardwood Draw

Thirteen species were noted in the hardwood draw habitat on the modified BBS. The mourning dove was most frequently noted, representing 27 percent of the birds recorded in woody draws. The yellow warbler, robin, house wren and brown thrasher followed the mourning dove in decreasing order of abundance. These five species comprised about 70 percent of birds recorded in hardwood draws on the survey.

The modified BBS was found to be inadequate in sampling breeding birds in hardwood draws, as only 32 percent of the species noted in hard-



wood draws throughout the month of June from all surveys combined were detected on the BBS. In contrast, over 82 percent of species seen in grasslands in June were also detected on the BBS. Walking surveys, therefore, were undertaken to supplement the BBS in this habitat. Thirty-five species were recorded on walking transects in June in three hardwood draws, a significant increase over the BBS results. The mourning dove was again most often encountered, followed by the robin, yellow warbler, goldfinch, house wren and rufous-sided towhee.

Five species were noted in hardwood draws during winter surveys. The common redpoll was most abundant (61 percent of birds observed in hardwood draws in winter), followed by magpies and black-capped chickadees.

During the entire inventory period, 83 bird species or about 50 percent of species recorded on the study area were in the hardwood draw habitat. This was the highest species total for all habitats, though hardwood draws comprised less than one percent of the area.

### **Bottomland Hardwood**

The mourning dove was the most commonly recorded bird of 18 species found in this habitat on the modified BBS. The flicker and field sparrow followed the mourning dove in frequency of occurrence. These three species comprised about 38 percent of the birds detected in this habitat. June walking surveys were also used to supplement the modified BBS in the bottomland hardwoods. Twenty-eight species were recorded on this survey, an increase of 55 percent from the BBS. The mourning dove was again most common, followed by the yellow warbler, goldfinch, cowbird and lark sparrow. Four species were seen in this habitat in winter. Throughout the inventory period, 59 species or 36 percent of all species recorded on the study area were noted in the bottomland hardwood habitat.

### **Combined Woody Habitats**

Though these habitats, the mesic shrub, hardwood draw and bottomland hardwood, comprised less than two percent of the study area combined, 106 bird species or 64 percent of all species seen on the study area were seen in these habitats. This demonstrates the importance of these limited woody habitats to the breeding and migratory avifauna on the study area.



Table 9. Birds Observed on the Southwest Glendive Study Area, 7 April 1981 — 30 April 1982

| Species (Common and Scientific Names)                     | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)   |
|---|--|---|
| Horned Grebe<br><i>Podiceps auritus</i>                   | m-R  | 24 April 1981 (4)   |
| Eared Grebe<br><i>Podiceps nigricollis</i>                | b-U  | 6 May - 9 July 1981 (59);<br>16-30 April 1982 (8)                         |
| Western Grebe<br><i>Aechmophorus occidentalis</i>         | m-R  | 6 May 1981 (1)  |
| Pied-billed Grebe<br><i>Podilymbus podiceps</i>           | m-R  | 23 April, 20 May & 29 Sept. 1981 (3)                                      |
| White Pelican<br><i>Pelecanus erythrorhynchos</i>         | s-U  | 6 May, 17 June & 12 August 1981 (11);<br>19-22 April 1982 (11)            |
| Double-crested Cormorant<br><i>Phalacrocorax auritus</i>  | m-C  | 26 August & 9 October 1981 (77);<br>14-27 April 1982 (29)                 |
| Great Blue Heron<br><i>Ardea herodias</i>                 | s-U  | 15 May-29 Sept 1981 (12);<br>1-30 April 1982 (4)                          |
| Black-crowned Night Heron<br><i>Nycticorax nycticorax</i> | s-U  | 6 May & 9 July 1981 (3);<br>13 April 1982 (4)                             |
| Canada Goose<br><i>Branta canadensis</i>                  | B-C  | 24 April-3 Dec 1981 (137);<br>26 Feb-16 April 1982 (108)                  |
| Mallard<br><i>Anas platyrhynchos</i>                      | B-A  | 23 April-22 Dec 1981 (402);<br>18 March-30 April 1982 (618)               |
| Gadwall<br><i>Anas strepera</i>                           | B-U  | 24 April-29 Sept 1981 (44);<br>14-30 April 1982 (27)                      |
| Pintail<br><i>Anas acuta</i>                              | b-C  | 23 April-23 June (11) & 29 Sept 1981<br>(2); 23 March-30 April 1982 (133) |
| Green-winged Teal<br><i>Anas crecca</i>                   | b-C  | 24 April-3 Sept 1981 (82);<br>9-30 April 1982 (322)                       |
| Blue-winged Teal<br><i>Anas discors</i>                   | B-C  | 23 April-25 Aug 1981 (139);<br>16-30 April 1982 (12)                      |
| Cinnamon Teal<br><i>Anas cyanoptera</i>                   | m-R  | 16 April 1982 (3)   |
| American Wigeon<br><i>Anas americana</i>                  | B-C  | 23 April - 6 Nov 1981 (90);<br>14-30 April 1982 (47)                      |
| Northern Shoveler<br><i>Anas clypeata</i>                 | b-U  | 23 April-9 July 1981 (30);<br>8-30 April 1982 (35)                        |
| Wood Duck<br><i>Aix sponsa</i>                            | s-R  | 9 July 1981 (1)   |
| Redhead<br><i>Aythya americana</i>                        | s-U  | 24 April-29 Sept 1981 (39);<br>30 March-30 April 1982 (8)                 |
| Ring-necked Duck<br><i>Aythya collaris</i>                | m-U  | 23 April-6 May 1981 (12);<br>14-21 April 1982 (14)                        |
| Canvasback<br><i>Aythya valisineria</i>                   | m-R  | 6 May 1981 (1)  |
| Lesser Scaup<br><i>Aythya affinis</i>                     | m-U  | 23 April-20 May (43) & 29 Sept-22 Oct<br>1981 (11); 14-30 April 1982 (16) |
| Common Goldeneye<br><i>Bucephala clangula</i>             | m-U  | 24 April 1981 (1);<br>14 & 15 April 1982 (7)                              |

Table 9. (continued)

| Species (Common and Scientific Names)                 | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)  |
|---|--|--|
| Bufflehead<br><i>Bucephala albeola</i>                | m-U  | 24 April-19 May 1981 (8);<br>27 April 1982 (1)                           |
| Ruddy Duck<br><i>Oxyura jamaicensis</i>               | m-U  | 23 April-23 June 1981 (53);<br>23-24 April 1982 (37)                     |
| Common Merganser<br><i>Mergus merganser</i>           | m-U  | 23 June 1981 (1);<br>30 March-22 April 1982 (19)                         |
| Turkey Vulture<br><i>Cathartes aura</i>               | s-U  | 24 June-24 Aug 1981 (5);<br>19 April 1982 (2)                            |
| Sharp-shinned Hawk<br><i>Accipiter striatus</i>       | m-U  | 29 April-13 May (4) & 10-17 Sept 1981<br>(4); 31 March-23 April 1982 (5) |
| Cooper's Hawk<br><i>Accipiter cooperii</i>            | B-U  | 13 May-26 Aug 1981 (13)  |
| Red-tailed Hawk<br><i>Buteo jamaicensis</i>           | B-U  | 8 April-8 Oct 1981 (52);<br>18 March-28 April 1982                       |
| Swainson's Hawk<br><i>Buteo swainsoni</i>             | B-C  | 28 April-29 Sept 1981 (87);<br>19-30 April 1982 (21)                     |
| Rough-legged Hawk<br><i>Buteo lagopus</i>             | m-U  | 8 Oct-23 Dec. 1981 (8);<br>18 March-21 April 1982 (3)                    |
| Ferruginous Hawk<br><i>Buteo regalis</i>              | B-U  | 7 April-30 Sept 1981 (24);<br>18 March-30 April 1982 (17)                |
| Golden Eagle<br><i>Aquila chrysaetos</i>              | s-U, W-U                                   | YR <sup>2</sup> (73)   |
| Bald Eagle<br><i>Aquila leucocephalus</i>             | m-U  | 23 Oct & 5 Nov 1981 (2);<br>30 March, 8 & 12 April 1982 (4)              |
| Marsh Hawk<br><i>Circus cyaneus</i>                   | B-C  | 7 April-23 Dec 1981 (372);<br>18 March-30 April 1982 (260)               |
| Osprey <sup>3</sup><br><i>Pandion haliaetus</i>       | m-R  | 8 May 1981 (1)   |
| Prairie Falcon<br><i>Falco mexicanus</i>              | s-R, w-U, m-U                              | YR (23)  |
| Peregrine Falcon<br><i>Falco peregrinus</i>           | m-R  | 6 Aug 1981 (1); 20 & 23 April 1982 (2)                                   |
| Merlin<br><i>Falco columbarius</i>                    | m-U  | 14 May, 4 Aug-3 Dec 1981 (14);<br>18 & 24 March 1982 (2)                 |
| American Kestrel<br><i>Falco sparverius</i>           | B-C  | 9 April-16 Oct 1981 (144);<br>30 March-30 April 1982 (68)                |
| Sharp-tailed Grouse<br><i>Pediacetes phasianellus</i> | B-A, W-C                                   | YR (1739)  |
| Ring-necked Pheasant<br><i>Phasianus colchicus</i>    | B-C, W-U                                   | YR (167)   |
| Gray Partridge<br><i>Perdix perdix</i>                | b-C, W-U                                   | YR (123)   |
| Turkey <sup>4</sup><br><i>Meleagris gallopava</i>     | m-R  | March & April 1981   |
| Sandhill Crane<br><i>Grus canadensis</i>              | m-C  | 30 April, 15-22 Oct 1981 (174);<br>31 March & 12 April 1982 (400)        |
| Sora<br><i>Porzana carolina</i>                       | s-R  | 30 April-25 June 1981 (4)  |

Table 9. (continued)

| Species (Common and Scientific Names)                   | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)                              |
|---|--|--|
| American Coot<br><i>Fulica americana</i>                | s-C  | 23 April-29 Sept 1981 (181);<br>16-30 April 1982 (6)         |
| Killdeer<br><i>Charadrius vociferus</i>                 | B-C  | 23 April 1981 - 29 Sept 1981<br>30 March-30 April 1982 (118) |
| Common Snipe<br><i>Capella gallinago</i>                | b-U  | 29 April-5 Aug 1981 (29);<br>22-30 April 1982 (8)            |
| Long-billed Curlew<br><i>Numenius americanus</i>        | m-R  | 30 April 1981 (2);<br>12 & 19 April 1982 (2)                 |
| Upland Sandpiper<br><i>Bartramia longicauda</i>         | b-U  | 1 May-5 Aug 1981 (15)  |
| Spotted Sandpiper<br><i>Actitis macularia</i>           | s-U  | 20 May-3 Sept 1981 (10)                                      |
| Solitary Sandpiper<br><i>Tringa solitaria</i>           | m-R  | 28 April - 14 May 1981 (4)                                   |
| Willet<br><i>Catoptrophorus semipalmatus</i>            | m-R  | 13 May 1981 (2)  |
| Lesser Yellowlegs<br><i>Tringa flavipes</i>             | m-U  | 30 April, 8 & 9 July 1981 (14);<br>14 & 23 April 1982 (5)    |
| Baird's Sandpiper<br><i>Calidris bairdii</i>            | m-R  | 5 August 1981(1)   |
| Least Sandpiper<br><i>Calidris minutilla</i>            | m-R  | 13 May, 5 Aug 1981 (4)                                       |
| Long-billed Dowitcher<br><i>Limnodromus scolopaceus</i> | m-R  | 30 April 1982 (5)  |
| Marbled Godwit<br><i>Limosa fedoa</i>                   | m-R  | 29 April 1981 (2)  |
| American Avocet<br><i>Recurvirostra americana</i>       | m-R  | 19 May 1981 (1)  |
| Wilson's Phalarope<br><i>Steganopus tricolor</i>        | m-U  | 13 May-23 June 1981 (44)                                     |
| Ring-billed Gull<br><i>Larus delawarensis</i>           | m-U  | 19 & 21 May, 9 July 1981 (6);<br>12-30 April 1982 (25)       |
| Franklin's Gull<br><i>Larus pipixcan</i>                | m-U  | 19 & 30 April 1982 (21)                                      |
| Black Tern<br><i>Chlidonias niger</i>                   | m-U  | 20 May & 23 June 1981 (7)                                    |
| Rock Dove<br><i>Columbus livia</i>                      | b-U,W-U                                    | YR (122)   |
| Mourning Dove<br><i>Zenaida macroura</i>                | B-A  | 7 April-29 Sept 1981 (2612);<br>14-30 April 1982 (97)        |
| Black-billed Cuckoo<br><i>Coccyzus erythrophthalmus</i> | s-R  | 10-25 June 1981 (4)  |
| Great-horned Owl<br><i>Bubo virginianus</i>             | B-U  | YR (95)  |
| Burrowing Owl<br><i>Speotyto cunicularia</i>            | B-U  | 14 May-9 Oct 1981 (85);<br>28 & 30 April 1982 (2)            |
| Long-eared Owl<br><i>Asio otus</i>                      | m-U  | 10 Sept & 3 Dec 1981 (2);<br>24 March, 8 & 20 April 1982 (4) |

Table 9. (continued)

| Species (Common and Scientific Names)                    | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)                                      |
|--|--|--|
| Short-eared Owl<br><i>Asio flammeus</i>                  | b-U  | 9 April-15 Oct 1981 (28);<br>8-30 April 1982 (35)                    |
| Common Nighthawk<br><i>Chordeiles minor</i>              | b-C  | 10 June-25 Aug 1981 (110)  |
| Belted Kingfisher<br><i>Megaceryle alcyon</i>            | s-U  | 28 April-15 Sept 1981 (5);<br>28 April 1982 (1)                      |
| Common Flicker<br><i>Colaptes auratus</i>                | B-C  | 9 April-9 Oct 1981 (133);<br>31 March-30 April 1982 (34)             |
| Yellow-bellied Sapsucker<br><i>Sphyrapicus varius</i>    | m-R  | 21 April 1982 (1)  |
| Hairy Woodpecker<br><i>Dendrocopos villosus</i>          | s-U  | 16 & 18 June, 15 Sept, 23 Oct 1981<br>(5); 30 March 1982 (1)         |
| Downy Woodpecker<br><i>Dendrocopos pubescens</i>         | s-U  | 19 July-17 Nov 1981 (10)   |
| Eastern Kingbird<br><i>Tyrannus tyrannus</i>             | B-C  | 13 May-3 Sept 1981 (238)   |
| Western Kingbird<br><i>Tyrannus verticalis</i>           | B-C  | 14 May-10 Sept 1981 (195)  |
| Say's Phoebe<br><i>Sayornis saya</i>                     | B-C  | 23 April-18 Sept 1981 (103);<br>15-30 April 1982 (16)                |
| Least Flycatcher<br><i>Empidonax minimus</i>             | b-U  | 6 May-15 Sept 1981 (32);   |
| Western Wood Pewee<br><i>Contopus sordidulus</i>         | b-U  | 18 June-1 Sept 1981 (9)  |
| Horned Lark<br><i>Eremophila alpestris</i>               | B-A,W-A                                    | YR (13,690)  |
| Bank Swallow<br><i>Riparia riparia</i>                   | b-U  | 13 May-23 July 1981 (72)   |
| Rough-winged Swallow<br><i>Stelgidopteryx ruficollis</i> | b-U  | 28 April-22 July 1981 (44);<br>28 April 1982 (1)                     |
| Barn Swallow<br><i>Hirundo rustica</i>                   | B-C  | 30 April-29 Sept 1981 (505);<br>27-30 April 1982 (8)                 |
| Cliff Swallow<br><i>Petrochelidon pyrrhonota</i>         | s-R  | 21 May-8 July 1981 (4)   |
| Blue Jay<br><i>Cyanocitta cristata</i>                   | m-R  | 9 Oct 1981 (1)   |
| Black-billed Magpie<br><i>Pica pica</i>                  | B-U,W-U                                    | YR (180)   |
| Common Crow<br><i>Corvus brachyrhynchos</i>              | m-C  | 24 April, 1 May, 8-15 Oct 1981 (106);<br>25 March-20 April 1982 (64) |
| Pinon Jay<br><i>Gymnorhinus cyanocephalus</i>            | m-U/R                                      | 18 Aug 1981(40)  |
| Black-capped Chickadee<br><i>Parus atricapillus</i>      | b-U,w-U                                    | YR (100)   |
| Red-breasted Nuthatch<br><i>Sitta canadensis</i>         | s-U  | 20 May-16 Sept 1981 (13)   |
| House Wren<br><i>Troglodytes aedon</i>                   | b-C  | 13 May-19 Sept 1981 (119)  |

Table 9. (continued)

| Species (Common and Scientific Names)              | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)                             |
|--|--|---|
| Rock Wren<br><i>Salpinctes obsoletus</i>           | B-U  | 24 April-17 Sept 1981 (39);<br>22-29 April 1982 (5)         |
| Gray Catbird<br><i>Dumetella carolinensis</i>      | b-U  | 21 May-10 Sept 1981 (9)                                     |
| Brown Thrasher<br><i>Toxostoma rufum</i>           | b-C  | 7 May-18 Sept 1981 (115)                                    |
| Sage Thrasher<br><i>Oreoscoptes montanus</i>       | m-R  | 16 July 1981 (1)  |
| American Robin<br><i>Turdus migratorius</i>        | B-C  | 7 April-15 Oct 1981 (361);<br>30 March-30 April 1982 (85)   |
| Hermit Thrush<br><i>Catharus guttatus</i>          | m-R  | 15 Oct 1981 (1)   |
| Swainson's Thrush<br><i>Catharus ustulatus</i>     | m-U  | 13 May-25 June & 10 Sept-30 Sept 1981<br>(6)                |
| Gray-cheeked Thrush<br><i>Catharus minimus</i>     | m-R  | 14 May 1982 (1)   |
| Mountain Bluebird<br><i>Sialia currucoides</i>     | b-U  | 7 April-17 Sept 1981 (67);<br>18 March-28 April 1982 (26)   |
| Townsend's Solitaire<br><i>Myodestes townsendi</i> | m-R  | 10 Sept 1981 (1)  |
| Golden-crowned Kinglet<br><i>Regulus satrapa</i>   | m-R  | 23 Oct 1981 (1)   |
| Ruby-crowned Kinglet<br><i>Regulus calendula</i>   | m-U  | 13 May (1), 31 August-15 Oct 1981<br>(10); 22 April-1982(1) |
| Sprague's Pipit<br><i>Anthus spraguelli</i>        | b-U  | 24 April-26 Aug 1981 (90);<br>22-28 April 1982 (6)          |
| Bohemian Waxwing<br><i>Bombycilla garrulus</i>     | m-C  | 24 March-20 April 1982 (657)                                |
| Cedar Waxwing<br><i>Bombycilla cedrorum</i>        | b-U  | 24 June-15 Sept 1981 (14)                                   |
| Northern Shrike<br><i>Lanius excubitor</i>         | m-U,w-R                                    | 15 Oct 1981-16 April 1982 (9)                               |
| Loggerhead Shrike<br><i>Lanius ludovicianus</i>    | B-C  | 24 April-18 Sept 1981 (122);<br>20-30 April 1982 (6)        |
| Starling<br><i>Sturnus vulgaris</i>                | b-C,W-U                                    | YR (581)  |
| Red-eyed Vireo<br><i>Vireo olivaceus</i>           | s-R  | 2, 16 & 24 June 1981 (4)                                    |
| Warbling Vireo<br><i>Vireo gilvus</i>              | b-U  | 14 May-10 Sept 1981 (12)                                    |
| Black and White Warbler<br><i>Mniotilta varia</i>  | m-R  | 1 Sept 1981 (2)   |
| Tennessee Warbler<br><i>Vermivora peregrina</i>    | m-R  | 7 May & 15 Sept 1981 (2)                                    |
| Orange-crowned Warbler<br><i>Vermivora celata</i>  | m-U  | 28 April-14 May & 30 Sept-3 Oct 1981<br>(18)                |
| Nashville Warbler<br><i>Vermivora ruficapilla</i>  | m-R  | 14-16 Sept 1981 (2)   |



Table 9. (continued)

| Species (Common and Scientific Names)                           | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)                             |
|---|--|---|
| Yellow Warbler<br><i>Dendroica petechia</i>                     | B-C  | 8 May - 10 Sept 1981 (123)                                  |
| Cape May Warbler<br><i>Dendroica tigrina</i>                    | m-R  | 10 Sept 1981 (1)  |
| Yellow-rumped Warbler<br><i>Dendroica coronata</i>              | m-U  | 24 April-7 May (13) & 3-30 Sept 1981 (53)                   |
| Blackpoll Warbler<br><i>Dendroica petechia</i>                  | m-R  | 20 & 21 May (2), 1 & 10 Sept 1981 (2)                       |
| Ovenbird<br><i>Seiurus aurocapillus</i>                         | m-R  | 20 May 1981 (1)   |
| MacGillivray's Warbler<br><i>Oporornis talmiei</i>              | m-R  | 14 May & 15 Sept 1981 (2)                                   |
| Common Yellowthroat<br><i>Geothlypis trichas</i>                | B-U  | 7 May - 4 Sept 1981 (58)                                    |
| Yellow-breasted Chat<br><i>Icteria virens</i>                   | b-U  | 11 June - 1 Sept 1981 (8)                                   |
| Wilson's Warbler<br><i>Wilsonia pusilla</i>                     | m-U  | 3-30 Sept 1981 (25)   |
| American Redstart<br><i>Setophaga ruticilla</i>                 | m-R  | 21 May (2), 16 & 17 Sept 1981 (2)                           |
| House Sparrow<br><i>Passer domesticus</i>                       | b-C,w-R                                    | YR (108)  |
| Bobolink<br><i>Dolichonyx oryzivorus</i>                        | b-U  | 21 May-25 June 1981 (13)                                    |
| Western Meadowlark<br><i>Sturnella neglecta</i>                 | B-A  | 7 April-22 Oct 1981 (3797);<br>18 March-30 April 1982 (875) |
| Yellow-headed Blackbird<br><i>Xanthocephalus xanthocephalus</i> | B-C  | 30 April-9 July 1981 (170);<br>13 April 1982 (1)            |
| Red-winged Blackbird<br><i>Agelaius phoeniceus</i>              | b-A  | 7 April-6 Nov 1981 (618);<br>23 March-30 April 1982 (555)   |
| Orchard Oriole<br><i>Icterus spurius</i>                        | s-R  | 22 July 1981 (1)  |
| Northern Oriole<br><i>Icterus galbula</i>                       | s-U  | 21 May-25 June 1981 (12)                                    |
| Brewer's Blackbird<br><i>Euphaga cyanocephalus</i>              | B-C  | 28 April-15 Oct 1981 (814);<br>19-27 April 1982 (11)        |
| Common Grackle<br><i>Quiscalus quiscula</i>                     | b-U  | 28 April-15 Sept 1981 (32);<br>27 April 1982 (3)            |
| Brown-headed Cowbird<br><i>Molothrus ater</i>                   | B-C  | 30 April-15 Sept 1981 (332);<br>28 April 1982 (1)           |
| Black-headed Grosbeak<br><i>Pheucticus melanocephalus</i>       | m-R  | 3 Sept 1981 (1)   |
| Purple Finch<br><i>Carpodacus purpureus</i>                     | m-R  | 3 Sept 1981 (1)   |
| Hoary Redpoll<br><i>Acanthis hornemanni</i>                     | w-R  | 28 Jan 1982 (1)   |
| Common Redpoll<br><i>Acanthis flammea</i>                       | W-C  | 18 Nov 1981-9 April 1982 (830)                              |

Table 9. (continued)

| Species (Common and Scientific Names)                   | Status and Relative Abundance <sup>1</sup> | Dates Observed (Total Recorded)  |
|---|--|--|
| Pine Siskin<br><i>Spinus pinus</i>                      | m-R  | 25 June 1981 (2)   |
| American Goldfinch<br><i>Spinus tristis</i>             | b-C  | 13 May-18 Sept 1981 (166)  |
| Rufous-sided Towhee<br><i>Pipilo erythrophthalmus</i>   | B-C  | 1 May-30 Sept 1981 (150)   |
| Lark Bunting<br><i>Calamospiza melanocorys</i>          | B-A  | 6 May-10 Sept 1981 (2785)  |
| Savannah Sparrow<br><i>Passerculus sandwichensis</i>    | b-U  | 28 April-29 Sept 1981 (32);<br>29-30 April 1982 (11)                           |
| Grasshopper Sparrow<br><i>Ammodramus savannarum</i>     | B-C  | 29 April-26 Aug 1981 (173);<br>28 April 1982 (3)                               |
| Baird's Sparrow<br><i>Ammodramus bairdii</i>            | b-U  | 8 May-5 Aug 1981 (82)  |
| Vesper Sparrow<br><i>Poocetes gramineus</i>             | b-C  | 23 April-15 Oct 1981 (390);<br>23-30 April 1982 (26)                           |
| Lark Sparrow<br><i>Chondestes grammacus</i>             | B-C  | 1 May-28 Aug 1981 (147)  |
| Dark-eyed Junco<br><i>Junco hyemalis</i>                | m-U  | 29 Sept-16 Oct 1981 (14);<br>8-21 April 1982 (17)                              |
| Tree Sparrow<br><i>Spizella arborea</i>                 | m-C  | 7 April 1981 (2);<br>29 Sept-3 Dec 1981 (107);<br>18 March-23 April 1982 (830) |
| Chipping Sparrow<br><i>Spizella passerina</i>           | m-C,s-U                                    | 28 April-27 May (33) & 16 July-8 Oct<br>1981 (121)                             |
| Clay-colored Sparrow<br><i>Spizella pallida</i>         | m-U,b-U                                    | 1 May-30 Sept 1981 (142)   |
| Brewer's Sparrow<br><i>Spizella breweri</i>             | s-U  | 6 May-8 July 1981 (10)   |
| Field Sparrow<br><i>Spizella pusilla</i>                | m-U,B-U                                    | 28 April-18 Aug 1981 (121);<br>28 April 1982 (2)                               |
| Harris' Sparrow<br><i>Zonotrichia querula</i>           | m-R  | 29 Sept 1981 (1)   |
| White-crowned Sparrow<br><i>Zonotrichia leucophrys</i>  | m-U  | 28 April-13 May (9) & 9 Sept-15 Oct<br>1981 (41); 27-30 April 1982 (7)         |
| White-throated Sparrow<br><i>Zonotrichia albicollis</i> | m-U  | 9-30 Sept 1981 (7)   |
| Lincoln's Sparrow<br><i>Melospiza lincolni</i>          | m-U  | 13-14 May (2) & 31 Aug-18 Sept 1981<br>(6)                                     |
| Song Sparrow<br><i>Melospiza melodia</i>                | m-U  | 30 April-1 May (3) & 1 Sept-9 Oct<br>1981 (4); 30 April 1982 (2)               |
| McCown's Longspur<br><i>Calcarius mccownii</i>          | m-R  | 24 April 1981 (1)  |
| Lapland Longspur<br><i>Calcarius lapponicus</i>         | w-R,m-U                                    | 5-17 Nov 1981 (16);<br>26 Feb-25 March 1982 (13)                               |
| Chestnut-collared Longspur<br><i>Calcarius vornatus</i> | B-A  | 23 April-22 Oct 1981 (1408);<br>13-30 April 1982 (514)                         |
| Snow-Bunting<br><i>Plectrophenax nivalis</i>            | W-C  | 6 Nov 1981-30 March 1982 (973)   |

- <sup>1</sup> A —Abundant (more than 1000 recorded)
- C —Common (100-999 recorded)
- U —Uncommon (5-99 recorded)
- R —Rare (less than 5 recorded)
- m —migrant only
- w —transient in winter
- W —overwinters
- s —present during summer, but no evidence of breeding
- b —suspected of breeding (territorial males or pairs present)
- B —breeding documented (active nest or dependent young)

<sup>2</sup>YR—Present year-round

<sup>3</sup>Observed about 3 miles south of area

<sup>4</sup>Reported by landowners on area

## MAMMALS

Twenty-three mammal species were noted on the study area (Table 10). No mammal "species of special concern" to Montana were found on the area, though Flath (1981a) lists six species suspected or known to occur in Dawson County; some of these species may occur on the study area. Appendices B through F present seasonal habitat affinities for mammals other than big game (previously treated) or small mammals (treated separately below).

Only one bat was collected, a hoary bat found in a hardwood draw in late August. Several unidentified bats were observed around an old homesite and small pond; attempts to capture them with mist nets were unsuccessful. Matthews and Swenson (1982) list ten species of bats known or suspected to occur in east central Montana.

The desert cottontail was abundant throughout the inventory period, most often observed in grassland or in or near mesic shrub and hardwood draw habitats. Though all road-kills examined were desert cottontails, mountain cottontails (*Sylvilagus nuttalli*) may also occur on the study area as Matthews and Swenson (1982) collected this species from mesic shrub (rose-snowberry) habitat in Dawson County. White-tailed jackrabbits were also common, most often seen in grassland or sagebrush-grassland areas.

The thirteen-lined ground squirrel was infrequently observed during summer in grassland or cropland. Fox squirrels were seen in a hardwood draw on the west side of the study area. Leaf and twig drays suggested nesting on the area. Pocket gophers were locally common in grassland and alfalfa fields. Porcupines were occasionally observed in grassland in summer but were most often noted in mesic shrubs and hardwood draws throughout the year.

Table 10. Mammals Identified on the Southwest Glendive Study Area<sup>1</sup>

| Species                        | Scientific Name                      | Relative Abundance <sup>2</sup> | Total Recorded Observations |
|--------------------------------|--------------------------------------|---------------------------------|-----------------------------|
| Hayden Shrew                   | <i>Sorex haydeni</i>                 | R                               | 2                           |
| Hoary Bat                      | <i>Lasiurus cinereus</i>             | R                               | 1                           |
| Desert Cottontail              | <i>Sylvilagus audubonii</i>          | A                               | 152                         |
| White-tailed Jackrabbit        | <i>Lepus townsendii</i>              | C                               | 119                         |
| Thirteen-lined Ground Squirrel | <i>Spermophilus tridecemlineatus</i> | U                               | 13                          |
| Fox Squirrel                   | <i>Sciurus niger</i>                 | R                               | 3+                          |
| Northern Pocket Gopher         | <i>Thomomys talpoides</i>            | U                               | —                           |
| Olive-backed Pocket Mouse      | <i>Perognathus fasciatus</i>         | R                               | 1                           |
| Beaver                         | <i>Castor canadensis</i>             | R                               | 1                           |
| Western Harvest Mouse          | <i>Reithrodontomys megalotis</i>     | C                               | 39                          |
| Deer Mouse                     | <i>Peromyscus maniculatus</i>        | A                               | 119                         |
| Northern Grasshopper Mouse     | <i>Onychomys leucogaster</i>         | R                               | 2                           |
| Prairie Vole                   | <i>Microtus ochrogaster</i>          | C                               | 9                           |
| Porcupine                      | <i>Erethizon dorsatum</i>            | C                               | 26                          |
| Coyote                         | <i>Canis latrans</i>                 | C                               | 46                          |
| Red Fox                        | <i>Vulpes vulpes</i>                 | U                               | 28                          |
| Raccoon                        | <i>Procyon lotor</i>                 | U                               | 12                          |
| Mink                           | <i>Mustela vison</i>                 | R                               | 2                           |
| Badger                         | <i>Taxidea taxus</i>                 | R                               | 1                           |
| Striped Skunk                  | <i>Mephitis mephitis</i>             | U                               | 11                          |
| Mule Deer                      | <i>Odocoileus hemionus</i>           | C                               | 738                         |
| White-tailed Deer              | <i>Odocoileus virginianus</i>        | C                               | 1170                        |
| Pronghorn                      | <i>Antilocapra americana</i>         | C                               | 3642                        |

<sup>1</sup>Taxonomic sequence and nomenclature follows Thompson, L.S., Distribution of Montana Amphibians, Reptiles and Mammals (1982).

<sup>2</sup> A — Abundant  
C — Common  
U — Uncommon  
R — Rare

## Small Mammal Trapping

The results of small mammal trapping are summarized in Table 11. Over 2,800 trap nights of effort were expended in late August through mid-September; this was corrected to 2,459 trap nights by subtraction of sprung but empty traps. Traps were sprung by insects, livestock and other unknown causes, as well as by mammals such as skunks and raccoons which became very proficient at raiding one trapline in a hardwood draw, springing 76 of 100 traps on the final night of trapping.

A total of 171 captures in 2,459 trap nights resulted in an overall trapping efficiency of 6.95 captures/100 trap nights. Of the seven species trapped, only the deer mouse was encountered in every habitat sampled. Deer mice comprised 70 percent of all captures and were most abundant in every habitat except the bottomland hardwood-sagebrush site.

In the combined grassland trap sites, six species were captured. The difference in vegetation composition and density was reflected in a greater species total (6) and greater total capture (50) for the more vegetatively diverse and dense western wheatgrass/needleandthread site. The more sparsely vegetated blue grama site produced only three species in 15 captures. The wheatgrass site had three times the number of captures and higher trap night efficiency. The western harvest mouse and prairie vole followed the deer mouse in abundance on the wheatgrass site.

Four species were captured in the combined hardwood draw trap sites, three from each trapline. Deer mice were more frequently trapped in

both hardwood draw sites than in any other trap site. The only Hayden shrews captured were from the open canopy draw, which had a greater density of shrubs and forbs than the closed canopy draw. Trap efficiency was higher in the open canopy draw, probably reflecting the greater forb and shrub cover. Highest trap efficiency of all trap sites was from the open canopy site.

Upland crop traplines were in two separate stubble wheat fields. Of the two species captured in these sites, deer mice were most prevalent. Capture rate was lower than for all other sites except bottomland hayfield. The bottomland hayfield site, largely crested wheatgrass (*Agropyron cristatum*) stubble, had not only the lowest capture rate but the lowest species total, with only three individual deer mice being caught. The spraying of this field with endrin in the spring of 1981 may have influenced capture results.

Two species were captured on the bottomland hardwood-sagebrush trapline, with over twice as many western harvest mice than deer mice represented in the sample. The capture rate was near the average for all sites.

Flath (1981b) recommended trapping for five consecutive nights and the use of pitfall traps to obtain an adequate sample of species composition, especially stressing the importance of pitfalls for sampling shrews and voles. The employment of these techniques may have detected additional species of small mammals as Thompson (1982) lists one additional shrew and seven additional rodent species, including two vole species, that have been collected in east central Montana.

Table 11. Summary of Small Mammal Trapping Results, Southwest Glendive Study Area, August–September, 1981

|                          | Grassland  |            | Combined<br>Grassland | Upland<br>Crop | Hardwood Draw    |                      | Combined<br>Hardwood<br>Draw | Bottomland<br>Hayfield | Bottomland<br>Hardwood<br>Sagebrush |
|--------------------------|------------|------------|-----------------------|----------------|------------------|----------------------|------------------------------|------------------------|-------------------------------------|
|                          | Wheatgrass | Blue Grama |                       |                | Closed<br>Canopy | Open<br>Canopy       |                              |                        |                                     |
| Trap Nights <sup>1</sup> | 361        | 351        | 712                   | 505            | 381              | 202                  | 583                          | 294                    | 365                                 |
| Total Captures           | 50         | 15         | 65                    | 9              | 33               | 32                   | 65                           | 3                      | 29                                  |
| Captures/100 Trap Nights | 13.85      | 4.27       | 9.13                  | 1.78           | 8.66             | 15.84                | 11.14                        | 1.02                   | 7.95                                |
| Number of Species        | 6          | 3          | 6                     | 2              | 3                | 3                    | 4                            | 1                      | 2                                   |
| SPECIES:                 |            |            |                       |                |                  |                      |                              |                        |                                     |
| Hayden Shrew             |            |            |                       |                |                  | 2(0.99) <sup>2</sup> | 2(0.34)                      |                        |                                     |
| 13-lined Ground Squirrel | 1(0.28)    |            | 1(0.14)               |                |                  |                      |                              |                        |                                     |
| Pocket Mouse             | 1(0.28)    |            | 1(0.14)               |                |                  |                      |                              |                        |                                     |
| W. Harvest Mouse         | 13(3.60)   | 1(0.28)    | 14(1.97)              |                | 1(0.26)          | 2(0.99)              | 3(0.51)                      |                        | 2(0.548)                            |
| Deer Mouse               | 27(7.48)   | 13(3.70)   | 40(5.62)              | 8(1.58)        | 31(8.14)         | 28(13.86)            | 59(10.12)                    | 3(1.02)                | 9(2.47)                             |
| N. Grasshopper Mouse     | 2(0.55)    |            | 2(0.28)               |                |                  |                      |                              |                        |                                     |
| Prairie Vole             | 6(1.66)    | 1(0.28)    | 7(0.98)               | 1(0.20)        | 1(0.26)          |                      | 1(0.17)                      |                        |                                     |

<sup>1</sup>Trap nights corrected by subtraction of sprung but empty traps.

<sup>2</sup>Number of animals trapped (number of animals per 100 trap nights).



## REPTILES AND AMPHIBIANS

Little effort was specifically devoted to the location of amphibians and reptiles on the study area. Table 12 lists the eight species of herptiles noted and their relative abundance on the area. Thompson (1982) listed an additional six species of reptiles and amphibians which occur in east central Montana. Some of these species may occur on the study area as well.

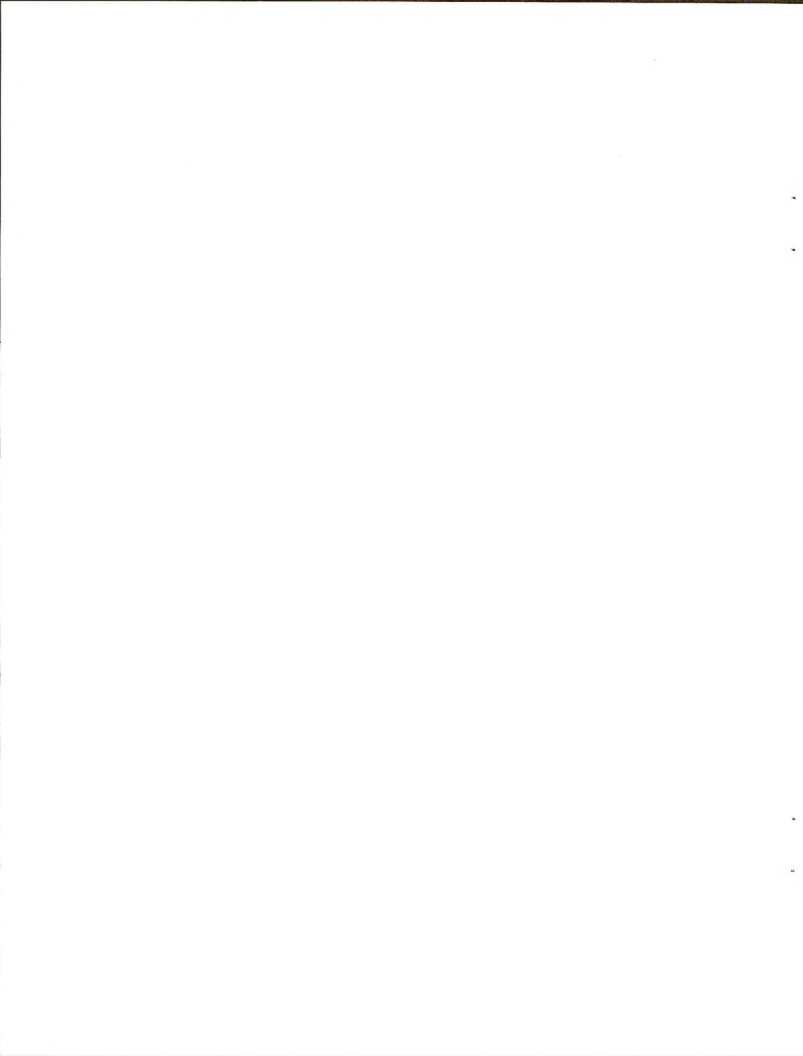
Table 12. Amphibians and Reptiles Identified on the Southwest Glendive Study Area, 1981-1982.

| Species                          | Scientific Name               | Relative Abundance <sup>2</sup> |
|----------------------------------|-------------------------------|---------------------------------|
| Rocky Mountain Toad              | <i>Bufo woodhousei</i>        | U                               |
| Boreal Chorus Frog               | <i>Pseudacris triseriata</i>  | C                               |
| Leopard Frog                     | <i>Rana pipiens</i>           | U                               |
| Painted Turtle                   | <i>Chrysemys picta</i>        | C                               |
| Racer                            | <i>Coluber constrictor</i>    | U                               |
| Bullsnake                        | <i>Pituophis melanoleucus</i> | U                               |
| Plains Garter Snake              | <i>Thamnophis radix</i>       | U                               |
| Western Rattlesnake <sup>1</sup> | <i>Crotalus viridis</i>       |                                 |

<sup>1</sup>Reported by landowners

<sup>2</sup> C—Common

U—Uncommon



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## Appendix A. Time Spent on Southwest Glendive Study Area, 1981-82

| Season         | On Ground | Hours on Study Area<br>Aerial Survey | Total |
|----------------|-----------|--------------------------------------|-------|
| Spring 1981    | 132       | 8                                    | 140   |
| Summer 1981    | 239       |                                      | 239   |
| Fall 1981      | 159       |                                      | 159   |
| Winter 1981-82 | 53        | 3                                    | 56    |
| Spring 1982    | 163       |                                      | 163   |
| Totals         | 746       | 11                                   | 757   |



**Appendix B. Spring 1981 Habitat Use by Mammals on the Southwest  
Glendive Study Area, Expressed in Percent of Observations<sup>1</sup>**

| Species                 | Sample<br>Size | Grassland | Sagebrush-<br>Grassland | Cropland | Hardwood<br>Draw | Mesic<br>Shrub | Bottomland<br>Hardwood |
|-------------------------|----------------|-----------|-------------------------|----------|------------------|----------------|------------------------|
| Desert Cottontail       | 32             | 41        | 13                      |          | 12               | 34             |                        |
| White-tailed Jackrabbit | 47             | 34        | 38                      | 7        | 6                | 15             |                        |
| Coyote                  | 10             | 100       |                         |          |                  |                |                        |
| Red Fox                 | 6              | 100       |                         |          |                  |                |                        |

**Appendix C. Summer 1981 Habitat Use by Mammals on the Southwest  
Glendive Study Area, Expressed in Percent of Observations<sup>1</sup>**

| Species                  | Sample<br>Size | Grassland | Sagebrush-<br>Grassland | Cropland | Hardwood<br>Draw | Mesic<br>Shrub | Bottomland<br>Hardwood |
|--------------------------|----------------|-----------|-------------------------|----------|------------------|----------------|------------------------|
| Desert Cottontail        | 58             | 51        |                         |          | 19               | 28             | 2                      |
| White-tailed Jackrabbit  | 19             | 63        | 11                      | 16       | 5                | 5              |                        |
| 13-lined Ground Squirrel | 11             | 82        |                         | 18       |                  |                |                        |
| Porcupine                | 5              | 60        |                         |          | 20               | 20             |                        |
| Coyote                   | 7              | 86        |                         |          |                  | 14             |                        |
| Red Fox                  | 18             | 83        |                         |          |                  | 17             |                        |
| Raccoon                  | 8              | 25        |                         |          | 75               |                |                        |

**Appendix D. Fall 1981 Habitat Use by Mammals on the Southwest  
Glendive Study Area, Expressed in Percent of Observations<sup>1</sup>**

| Species                 | Sample<br>Size | Grassland | Sagebrush-<br>Grassland | Cropland | Hardwood<br>Draw | Mesic<br>Shrub | Bottomland<br>Hardwood |
|-------------------------|----------------|-----------|-------------------------|----------|------------------|----------------|------------------------|
| Desert Cottontail       | 35             | 26        | 12                      |          | 11               | 37             | 14                     |
| White-tailed Jackrabbit | 8              | 88        |                         | 12       |                  |                |                        |
| Coyote                  | 18             | 89        |                         | 11       |                  |                |                        |
| Striped Skunk           | 5              | 40        |                         | 20       | 20               | 20             |                        |

<sup>1</sup> Includes all species with five or more observations excluding big game and small mammals.

**Appendix E. Winter 1981-82 Habitat Use by Mammals on the Southwest Glendive Study Area, Expressed in Percent of Observations<sup>1</sup>**

| Species                 | Sample Size | Grassland       | Sagebrush-Grassland | Cropland | Hardwood Draw | Mesic Shrub | Bottomland Hardwood |
|-------------------------|-------------|-----------------|---------------------|----------|---------------|-------------|---------------------|
| Desert Cottontail       | 13          | 16 <sup>2</sup> |                     |          | 46            | 23          | 15                  |
| White-tailed Jackrabbit | 5           | 60              | 20                  |          | 20            |             |                     |
| Porcupine               | 10          |                 |                     |          | 70            | 30          |                     |
| Coyote                  | 10          | 40              | 10                  | 30       |               |             |                     |

**Appendix F. Spring 1982 Habitat Use by Mammals on the Southwest Glendive Study Area, Expressed in Percent of Observations<sup>1</sup>**

| Species                 | Sample Size | Grassland | Sagebrush-Grassland | Cropland | Hardwood Draw | Mesic Shrub | Bottomland Hardwood |
|-------------------------|-------------|-----------|---------------------|----------|---------------|-------------|---------------------|
| Desert Cottontail       | 14          | 72        |                     |          | 7             | 14          | 7                   |
| White-tailed Jackrabbit | 40          | 47        | 3                   | 10       | 20            | 20          |                     |
| Porcupine               | 9           | 11        |                     |          | 67            | 22          |                     |
| Coyote                  | 15          | 73        |                     | 27       |               |             |                     |
| Striped Skunk           | 5           | 100       |                     |          |               |             |                     |

<sup>1</sup> Includes all species with five or more observations excluding big game and small mammals

# Appendix G. Location and Status of Raptor Nests on the Southwest Glendive Study Area, 1981-82

| Species          |   | Location               | Status <sup>1</sup>                     | Nest Substratum |
|------------------|---|------------------------|---|-----------------|
| Cooper's Hawk    |   | T16NR53E, Sec. 23 NWSW | Fledged one.                            | Green ash       |
| Red-tailed Hawk  | 1 | T14NR52E, Sec. 15 NWNW | Fledged 2-3.                            | Cottonwood      |
|                  | 2 | T16NR53E, Sec. 22 NWSE | Active; outcome unknown.                | Cottonwood      |
| Swainson's Hawk  | 1 | T15NR53E, Sec. 6 SESE  | Active; nest destroyed by wind.         | Cottonwood      |
|                  | 2 | T15NR52E, Sec. 14 NWNW | Active; outcome unknown.                | Cottonwood      |
|                  | 3 | T16NR52E, Sec. 32 SWSW | Active; outcome unknown.                | Green ash       |
|                  | 4 | T16NR52E, Sec. 22 NWSW | Active; outcome unknown.                | Cottonwood      |
|                  | 5 | T16NR53E, Sec. 25 NWSW | Fledged at least one.                   | Green ash       |
| Ferruginous Hawk |   | T16NR53E, Sec. 36 SWNE | Fledged at least one.                   | Scoria butte    |
| Marsh Hawk       | 1 | T16NR54E, Sec. 18 SWSW | Four nestlings; probable predation.     | Ground          |
|                  | 2 | T16NR53E, Sec. 23 NENE | Produced 3 eggs; outcome unknown.       | Ground          |
|                  | 3 | T16NR52E, Sec. 23 NWNE | Fledged 5                               | Ground          |
|                  | 4 | T14NR53E, Sec. 6 NENW  | Fledged 4                               | Ground          |
|                  | 5 | T16NR53E, Sec. 20 NWNE | Fledged 4                               | Ground          |
| Kestrel          |   | T15NR52E, Sec. 6 NENE  | Active; outcome unknown.                | Cottonwood      |
| Great-horned Owl | 1 | T16NR52E, Sec. 18 SWSE | At least 2 nestlings; probably fledged. | Russian olive   |
|                  | 2 | T15NR52E, Sec. 6 NESW  | Fledged 2-3, 1981; 3 nestlings, 1982.   | Cavity in cliff |
|                  | 3 | T14NR52E, Sec. 15 NWNW | Active 1982.                            | Cottonwood      |
|                  | 4 | T16NR52E, Sec. 32 SWSW | Active 1982.                            | Green ash       |
|                  | 5 | T16NR52E, Sec. 22 NWSE | Active 1982.                            | Cottonwood      |
|                  | 6 | T16NR53E, Sec. 26 SESE | Active 1982.                            | Green ash       |
|                  | 7 | T15NR53E, Sec. 20 NENE | Active 1982.                            | Boxelder        |
| Burrowing Owl    | 1 | T15NR54E, Sec. 19 SESE | Fledged at least 11.                    | Ground          |
|                  | 2 | T15NR53E, Sec. 12 NWSW | Fledged at least 5.                     | Ground          |
|                  | 3 | T15NR52E, Sec. 10 NENE | Fledged at least 2.                     | Ground          |

<sup>1</sup> Status for 1981 unless indicated

**Appendix H. Habitat Use by Birds on the Southwest Glendive Study Area, Spring 1981 (April and May), Expressed in Percent of Observations<sup>1</sup>**

| Species                    | Sample Size | Grass-land | Sagebrush-Grassland | Cropland | Mesic Shrub | Hardwood Draw | Bottomland Hardwood | Wetland | Homesites |
|----------------------------|-------------|------------|---------------------|----------|-------------|---------------|---------------------|---------|-----------|
| Swainson's Hawk            | 17          | 59         |                     | 41       |             |               |                     |         |           |
| Marsh Hawk                 | 30          | 33         | 10                  | 20       | 20          |               |                     | 10      |           |
| American Kestrel           | 20          | 15         |                     | 15       |             | 60            | 10                  |         |           |
| Sharp-tailed Grouse        | 91          | 70         | 29                  | 1        |             |               |                     |         |           |
| Ring-neck Pheasant         | 10          |            | 10                  | 40       | 50          |               |                     |         |           |
| Gray Partridge             | 5           |            |                     | 60       |             |               | 40                  |         |           |
| Killdeer                   | 64          | 20         | 5                   |          | 13          |               |                     | 62      |           |
| Mourning Dove              | 159         | 30         | 5                   | 10       | 4           | 26            | 7                   | 18      |           |
| Great Horned Owl           | 6           |            |                     |          | 50          |               | 50                  |         |           |
| Short-eared Owl            | 5           | 60         |                     | 40       |             |               |                     |         |           |
| Common Flicker             | 7           |            |                     |          | 14          | 72            | 14                  |         |           |
| Eastern Kingbird           | 38          | 21         | 8                   |          | 47          | 11            | 8                   | 5       |           |
| Western Kingbird           | 34          | 21         | 6                   | 9        | 43          | 15            | 3                   |         | 3         |
| Say's Phoebe               | 14          | 36         | 7                   |          | 21          | 22            |                     |         | 14        |
| Least Flycatcher           | 10          |            |                     |          | 10          | 90            |                     |         |           |
| Horned Lark                | 523         | 67         | 4                   | 29       |             |               |                     |         |           |
| Rough-winged Swallow       | 16          |            | 6                   |          |             | 13            |                     | 75      | 6         |
| Barn Swallow               | 67          | 8          | 13                  | 3        | 28          | 3             |                     | 39      | 6         |
| Black-capped Chickadee     | 6           |            |                     |          |             | 100           |                     |         |           |
| House Wren                 | 24          |            |                     |          |             | 92            | 8                   |         |           |
| Brown Thrasher             | 22          |            |                     |          | 40          | 55            | 5                   |         |           |
| American Robin             | 34          | 6          |                     |          | 26          | 62            | 6                   |         |           |
| Sprague's Pipit            | 7           | 100        |                     |          |             |               |                     |         |           |
| Loggerhead Shrike          | 12          | 42         | 8                   |          | 25          | 9             | 8                   |         | 8         |
| Starling                   | 49          | 22         | 20                  |          | 10          | 20            | 14                  |         | 14        |
| Yellow Warbler             | 29          |            |                     |          | 17          | 76            | 7                   |         |           |
| Yellowthroat               | 10          |            |                     |          | 70          |               |                     | 30      |           |
| House Sparrow              | 7           |            |                     |          |             |               |                     |         | 100       |
| Western Meadowlark         | 516         | 63         | 15                  | 15       | 5           | 2             |                     |         |           |
| Yellow-headed Blackbird    | 34          |            |                     |          | 3           |               |                     | 97      |           |
| Red-winged Blackbird       | 124         | 10         | 1                   | 1        | 45          |               | 9                   | 34      |           |
| Brewer's Blackbird         | 33          | 12         |                     | 9        | 22          | 9             | 12                  | 36      |           |
| Common Grackle             | 10          | 50         | 10                  |          | 40          |               |                     |         |           |
| Brown-headed Cowbird       | 89          | 28         |                     | 13       | 16          | 18            | 6                   | 16      | 3         |
| American Goldfinch         | 3           |            |                     |          | 43          | 57            |                     |         |           |
| Rufous-sided Towhee        | 2           |            |                     |          | 18          | 82            |                     |         |           |
| Lark Bunting               | 7           | 52         | 3                   | 44       | 1           |               |                     |         |           |
| Grasshopper Sparrow        | 3           | 92         |                     | 8        |             |               |                     |         |           |
| Beird's Sparrow            | 7           | 65         |                     | 35       |             |               |                     |         |           |
| Vesper Sparrow             | 0           | 47         | 33                  | 3        | 14          |               | 3                   |         |           |
| Lark Sparrow               | 1           | 9          | 27                  |          | 28          | 27            | 9                   |         |           |
| Chipping Sparrow           | 8           | 12         |                     |          |             | 75            | 13                  |         |           |
| Clay-colored Sparrow       | 4           | 3          |                     |          | 18          | 50            | 29                  |         |           |
| Chestnut-collared Longspur | 0           | 91         |                     | 9        |             |               |                     |         |           |

<sup>1</sup>Includes all species with five or more observations, excluding water birds

# Appendix I. Habitat Use by Birds on the Southwest Glendive Study Area, Summer 1981, Expressed in Percent of Observations<sup>1</sup>

| Species                    | Sample Size | Grass-land | Sagebrush-Grassland | Cropland | Mesic Shrub | Hardwood Draw | Bottomland Hardwood | Wetland | Homesites |
|----------------------------|-------------|------------|---------------------|----------|-------------|---------------|---------------------|---------|-----------|
| Cooper's Hawk              | 6           |            |                     |          |             | 100           |                     |         |           |
| Red-tailed Hawk            | 14          | 22         |                     |          | 7           | 14            | 57                  |         |           |
| Swainson's Hawk            | 15          | 73         |                     | 20       | 7           |               |                     |         |           |
| Ferruginous Hawk           | 7           | 100        |                     |          |             |               |                     |         |           |
| Golden Eagle               | 8           | 100        |                     |          |             |               |                     |         |           |
| Marsh Hawk                 | 100         | 67         | 1                   | 23       | 7           | 1             |                     | 1       |           |
| American Kestrel           | 27          | 48         |                     | 15       | 15          | 11            | 11                  |         |           |
| Sharp-tailed Grouse        | 116         | 97         |                     | 2        | 1           |               |                     |         |           |
| Ring-neck Pheasant         | 25          | 32         |                     | 12       | 36          | 12            | 4                   | 4       |           |
| Gray Partridge             | 35          | 46         |                     | 54       |             |               |                     |         |           |
| Killdeer                   | 208         | 24         |                     | 14       | 7           |               |                     | 51      | 4         |
| Upland Sandpiper           | 8           | 100        |                     |          |             |               |                     |         |           |
| Rock Dove                  | 34          | 62         |                     | 11       |             |               |                     | 27      |           |
| Mourning Dove              | 1,494       | 41         | 1                   | 28       | 18          | 7             | 5                   |         |           |
| Burrowing Owl              | 45          | 100        |                     |          |             |               |                     |         |           |
| Short-eared Owl            | 13          | 62         |                     | 38       |             |               |                     |         |           |
| Common Nighthawk           | 100         | 95         |                     |          |             | 2             |                     | 3       |           |
| Common Flicker             | 25          |            |                     |          | 11          | 43            | 29                  | 14      | 3         |
| Eastern Kingbird           | 164         | 37         | 2                   | 4        | 45          | 4             | 7                   | 1       |           |
| Western Kingbird           | 114         | 28         | 2                   | 10       | 37          | 2             | 19                  |         | 2         |
| Say's Phoebe               | 40          | 32         | 3                   | 7        | 18          | 5             | 12                  |         | 23        |
| Least Flycatcher           | 11          |            |                     |          | 27          | 55            | 18                  |         |           |
| Western Wood Pewee         | 5           |            |                     |          |             | 100           |                     |         |           |
| Horned Lark                | 3,942       | 63         | 2                   | 35       |             |               |                     |         |           |
| Bank Swallow               | 68          | 25         |                     |          |             |               |                     | 69      | 6         |
| Rough-winged Swallow       | 17          | 65         |                     |          |             | 23            |                     | 12      |           |
| Barn Swallow               | 388         | 28         |                     | 3        | 8           |               |                     | 25      | 36        |
| Black-billed Magpie        | 11          | 9          |                     | 9        |             | 27            | 55                  |         |           |
| Black-capped Chickadee     | 23          |            |                     |          |             | 100           |                     |         |           |
| House Wren                 | 34          |            |                     |          |             | 68            | 29                  |         | 3         |
| Rock Wren                  | 38          | 61         |                     |          |             |               |                     |         | 39        |
| Brown Thrasher             | 53          |            |                     |          | 22          | 76            | 2                   |         |           |
| American Robin             | 68          | 7          |                     |          | 28          | 57            | 6                   |         | 2         |
| Mountain Bluebird          | 31          | 16         | 7                   |          | 16          | 61            |                     |         |           |
| Sprague's Pipit            | 49          | 100        |                     |          |             |               |                     |         |           |
| Cedar Waxwing              | 8           |            |                     |          |             | 100           |                     |         |           |
| Loggerhead Shrike          | 65          | 43         |                     |          | 55          |               |                     |         | 2         |
| Starling                   | 71          | 39         |                     |          | 28          | 4             | 9                   |         | 20        |
| Warbling Vireo             | 5           |            |                     |          | 20          | 60            | 20                  |         |           |
| Yellow Warbler             | 59          |            |                     |          | 15          | 80            | 5                   |         |           |
| Yellowthroat               | 32          |            |                     |          | 41          |               | 6                   | 53      |           |
| Yellow-breasted Chat       | 5           |            |                     |          | 40          | 40            | 20                  |         |           |
| House Sparrow              | 37          |            |                     |          | 16          |               |                     | 8       | 70        |
| Bobolink                   | 12          | 92         |                     | 3        |             |               |                     |         |           |
| Western Meadowlark         | 2,206       | 64         | 7                   | 23       | 5           | 1             |                     |         |           |
| Yellow-headed Blackbird    | 23          | 17         | 4                   |          |             |               |                     | 79      |           |
| Red-winged Blackbird       | 434         | 24         |                     | 9        | 36          | 1             |                     | 29      | 1         |
| Northern Oriole            | 5           |            |                     |          | 20          | 40            | 40                  |         |           |
| Brewer's Blackbird         | 102         | 36         | 4                   | 11       | 13          |               | 28                  | 8       |           |
| Common Grackle             | 6           |            | 33                  |          | 34          |               |                     |         | 33        |
| Brown-headed Cowbird       | 196         | 53         | 6                   | 3        | 20          | 11            | 4                   | 2       | 1         |
| American Goldfinch         | 80          | 19         | 5                   | 1        | 12          | 57            | 5                   | 1       |           |
| Rufous-sided Towhee        | 53          |            |                     |          | 26          | 66            | 8                   |         |           |
| Lark Bunting               | 1,804       | 71         | 5                   | 20       | 4           |               |                     |         |           |
| Grasshopper Sparrow        | 179         | 93         | 2                   | 5        |             |               |                     |         |           |
| Baird's Sparrow            | 59          | 83         |                     | 17       |             |               |                     |         |           |
| Vesper Sparrow             | 159         | 54         | 21                  | 4        | 8           | 10            | 3                   |         |           |
| Lark Sparrow               | 102         | 21         | 8                   | 3        | 24          | 30            | 14                  |         |           |
| Chipping Sparrow           | 44          | 34         |                     |          | 16          | 50            |                     |         |           |
| Clay-colored Sparrow       | 16          | 19         | 19                  | 6        | 13          | 31            | 12                  |         |           |
| Brewer's Sparrow           | 5           |            | 80                  |          | 20          |               |                     |         |           |
| Field Sparrow              | 68          |            | 2                   |          | 48          | 32            | 18                  |         |           |
| Chestnut-collared Longspur | 894         | 93         |                     | 7        |             |               |                     |         |           |

<sup>1</sup> Includes all species with five or more observations, excluding water birds



# Appendix J. Habitat Use by Birds on the Southwest Study Area, Fall 1981, Expressed in Percent of Observations<sup>1</sup>

| Species                    | Sample Size | Grass-land | Sagebrush-Grassland | Cropland | Mesic Shrub | Hardwood Draw | Bottomland Hardwood | Wetland | Homesites |
|----------------------------|-------------|------------|---------------------|----------|-------------|---------------|---------------------|---------|-----------|
| Red-tailed Hawk            | 8           | 50         | 13                  | 25       | 12          |               |                     |         |           |
| Rough-legged Hawk          | 7           | 43         | 57                  |          |             |               |                     |         |           |
| Golden Eagle               | 15          | 80         | 7                   | 13       |             |               |                     |         |           |
| Marsh Hawk                 | 56          | 63         | 4                   | 16       | 13          | 1             |                     | 3       |           |
| Prairie Falcon             | 10          | 90         |                     |          |             | 10            |                     |         |           |
| Merlin                     | 7           | 71         |                     | 14       |             |               | 15                  |         |           |
| American Kestrel           | 18          | 44         |                     | 44       | 5           |               | 6                   |         |           |
| Sharp-tailed Grouse        | 194         | 43         |                     | 28       | 22          | 7             |                     |         |           |
| Ring-neck Pheasant         | 13          | 15         |                     |          | 62          |               | 23                  |         |           |
| Gray Partridge             | 52          | 61         |                     |          | 39          |               |                     |         |           |
| Killdeer                   | 7           | 14         |                     |          |             |               |                     | 86      |           |
| Rock Dove                  | 34          | 6          |                     |          | 6           |               | 3                   |         | 85        |
| Mourning Dove              | 182         | 41         | 1                   | 40       | 4           | 2             | 12                  |         |           |
| Great horned Owl           | 7           | 29         |                     |          | 14          | 43            | 14                  |         |           |
| Burrowing Owl              | 14          | 100        |                     |          |             |               |                     |         |           |
| Common Flicker             | 21          | 5          |                     |          | 14          | 38            | 43                  |         |           |
| Western Kingbird           | 7           | 14         |                     |          | 71          | 15            |                     |         |           |
| Say's Phoebe               | 9           | 22         |                     |          | 11          | 45            | 22                  |         |           |
| Horned Lark                | 2,836       | 49         | 4                   | 47       |             |               |                     |         |           |
| Barn Swallow               | 10          | 80         |                     |          |             |               |                     | 20      |           |
| Black-billed Magpie        | 45          | 29         |                     |          | 18          | 44            | 9                   |         |           |
| Black-capped Chickadee     | 7           |            |                     |          |             | 100           |                     |         |           |
| House Wren                 | 7           |            |                     |          | 14          | 43            | 43                  |         |           |
| Rock Wren                  | 6           | 100        |                     |          |             |               |                     |         |           |
| American Robin             | 41          | 2          |                     |          | 25          | 73            |                     |         |           |
| Mountain Bluebird          | 8           |            |                     |          | 37          | 63            |                     |         |           |
| Loggerhead Shrike          | 5           | 60         |                     |          | 40          |               |                     |         |           |
| Starling                   | 271         | 52         | 2                   |          | 18          |               | 4                   |         | 24        |
| Yellow-rumped Warbler      | 42          |            |                     |          | 7           | 91            | 2                   |         |           |
| Wilson's Warbler           | 18          |            |                     |          |             | 83            | 17                  |         |           |
| House Sparrow              | 47          |            |                     |          | 57          |               |                     |         | 43        |
| W. Meadowlark              | 1,051       | 56         | 6                   | 27       | 4           |               | 7                   |         |           |
| Red-winged Blackbird       | 23          | 78         |                     | 5        | 17          |               |                     |         |           |
| Brewer's Blackbird         | 14          | 100        |                     |          |             |               |                     |         |           |
| Common Redpoll             | 35          | 100        |                     |          |             |               |                     |         |           |
| American Goldfinch         | 14          | 29         |                     |          | 14          | 14            | 43                  |         |           |
| Rufous-sided Towhee        | 17          |            |                     |          | 6           | 88            | 6                   |         |           |
| Lark Bunting               | 285         | 61         |                     | 39       |             |               |                     |         |           |
| Savannah Sparrow           | 11          | 46         |                     |          | 9           |               | 45                  |         |           |
| Grasshopper Sparrow        | 7           | 100        |                     |          |             |               |                     |         |           |
| Vesper Sparrow             | 104         | 39         | 20                  | 7        | 17          |               | 17                  |         |           |
| Dark-eyed Junco            | 14          |            |                     |          | 36          | 36            | 28                  |         |           |
| Tree Sparrow               | 98          | 14         | 5                   |          | 62          | 5             | 14                  |         |           |
| Chipping Sparrow           | 46          | 22         |                     |          | 12          | 44            | 22                  |         |           |
| Clay-colored Sparrow       | 64          | 22         | 19                  | 1        | 3           | 16            | 39                  |         |           |
| White-crowned Sparrow      | 30          | 3          |                     |          | 83          | 7             | 7                   |         |           |
| Song Sparrow               | 5           |            |                     |          | 40          | 20            | 40                  |         |           |
| Chestnut-collared Longspur | 290         | 66         |                     | 34       |             |               |                     |         |           |

<sup>1</sup> Includes all species with five or more observations, excluding water birds

**Appendix K. Habitat Use by Birds on the Southwest Glendive Study  
Area, Winter 1981-82, Expressed in Percent of Observations<sup>1</sup>**

| Species                | Sample<br>Size | Grass-<br>land | Sagebrush-<br>Grassland | Cropland | Mesic<br>Shrub | Hardwood<br>Draw | Bottomland<br>Hardwood | Wetland | Homesites |
|------------------------|----------------|----------------|-------------------------|----------|----------------|------------------|------------------------|---------|-----------|
| Golden Eagle           | 7              | 86             |                         |          | 14             |                  |                        |         |           |
| Sharp-tailed Grouse    | 298            | 6              |                         | 45       | 48             |                  | 1                      |         |           |
| Gray Partridge         | 10             | 100            |                         |          |                |                  |                        |         |           |
| Rock Dove              | 33             |                |                         |          |                |                  |                        |         | 100       |
| Horned Lark            | 1,376          | 50             | 2                       | 48       |                |                  |                        |         |           |
| Black-billed Magpie    | 23             | 13             |                         |          | 52             | 30               | 5                      |         |           |
| Black-capped Chickadee | 6              |                |                         |          |                | 100              |                        |         |           |
| Starling               | 32             |                |                         | 63       | 37             |                  |                        |         |           |
| Common Redpoll         | 743            | 70             |                         | 9        | 17             | 4                |                        |         |           |
| Snow Bunting           | 1,166          | 10             |                         | 90       |                |                  |                        |         |           |

<sup>1</sup> Includes all species with five or more observations, excluding water birds

**Appendix L. Habitat Use by Birds on the Southwest Glendive Study Area, Spring 1982 (March and April), Expressed in Percent of Observations<sup>1</sup>**

| Species                    | Sample Size | Grass-land | Sagebrush-Grassland | Cropland | Mesic Shrub | Hardwood Draw | Bottomland Hardwood | Wetland | Homesites |
|----------------------------|-------------|------------|---------------------|----------|-------------|---------------|---------------------|---------|-----------|
| Red-tailed Hawk            | 26          | 31         |                     | 4        | 19          | 8             | 38                  |         |           |
| Swainson's Hawk            | 13          | 62         |                     | 38       |             |               |                     |         |           |
| Ferruginous Hawk           | 8           | 50         |                     | 25       |             | 13            | 12                  |         |           |
| Golden Eagle               | 19          | 84         |                     | 16       |             |               |                     |         |           |
| Marsh Hawk                 | 182         | 57         | 1                   | 35       | 4           | 2             | 1                   |         |           |
| American Kestrel           | 54          | 54         |                     | 30       | 7           | 7             | 2                   |         |           |
| Sharp-tailed Grouse        | 481         | 92         |                     | 3        | 3           | 2             |                     |         |           |
| Ring-necked Pheasant       | 36          | 61         | 3                   |          | 25          |               | 11                  |         |           |
| Gray Partridge             | 10          | 40         |                     | 20       | 40          |               |                     |         |           |
| Killdeer                   | 77          | 47         |                     | 2        |             |               | 2                   | 49      |           |
| Rock Dove                  | 7           |            |                     |          |             |               |                     |         | 100       |
| Mourning Dove              | 73          | 47         |                     | 7        | 29          | 1             | 15                  |         | 1         |
| Great-horned Owl           | 34          |            |                     |          | 18          | 32            | 47                  |         |           |
| Long-eared Owl             | 5           |            |                     |          | 20          | 80            |                     |         |           |
| Short-eared Owl            | 20          | 85         |                     | 15       |             |               |                     |         |           |
| Common Flicker             | 21          |            |                     |          | 29          | 38            | 28                  | 5       |           |
| Say's Phoebe               | 10          | 30         |                     |          | 60          |               |                     |         | 10        |
| Horned Lark                | 981         | 72         | 1                   | 27       |             |               |                     |         |           |
| Black-billed Magpie        | 31          | 13         |                     |          | 71          | 16            |                     |         |           |
| Common Crow                | 46          | 33         |                     | 30       | 37          |               |                     |         |           |
| Black-capped Chickadee     | 16          |            |                     |          |             | 88            | 12                  |         |           |
| American Robin             | 44          |            |                     |          | 45          | 55            |                     |         |           |
| Mountain Bluebird          | 21          | 4          | 35                  |          |             | 61            |                     |         |           |
| Bohemian Waxwing           | 387         |            |                     |          | 61          | 39            |                     |         |           |
| Starling                   | 269         |            |                     |          | 55          | 9             |                     |         |           |
| Western Meadowlark         | 808         | 74         | 4                   | 11       | 7           | 1             | 3                   |         |           |
| Red-winged Blackbird       | 110         | 15         |                     |          | 45          |               | 3                   | 37      |           |
| Common Redpoll             | 33          | 76         |                     |          |             | 25            |                     |         |           |
| Savannah Sparrow           | 11          | 55         |                     | 18       | 27          |               |                     |         |           |
| Vesper Sparrow             | 24          | 50         |                     | 29       | 21          |               |                     |         |           |
| Dark-eyed Junco            | 14          | 7          |                     |          | 7           | 86            |                     |         |           |
| Tree Sparrow               | 532         | 17         | 7                   |          | 63          | 9             | 4                   |         |           |
| White-crowned Sparrow      | 6           |            |                     |          | 100         |               |                     |         |           |
| Chestnut-collared Longspur | 245         | 95         |                     | 5        |             |               |                     |         |           |

<sup>1</sup> Includes all species with five or more observations, excluding water birds

# Appendix M. Results of Breeding Bird Surveys on the Southwest Glendive Study Area, June 1981<sup>1</sup>

| Species                    | Sample Size | % Composition <sup>2</sup> | Grass-land      | Sagebrush-Grassland | Cropland | Mesic Shrub | Hardwood Draw | Bottomland Hardwood | Wetland | Homesites |
|----------------------------|-------------|----------------------------|-----------------|---------------------|----------|-------------|---------------|---------------------|---------|-----------|
| Mallard                    | 4           |                            |                 |                     |          |             |               |                     |         |           |
| Red-tailed Hawk            | 2           |                            |                 |                     |          |             |               |                     |         |           |
| Ferruginous Hawk           | 1           |                            |                 |                     |          |             |               |                     |         |           |
| Golden Eagle               | 2           |                            |                 |                     |          |             |               |                     |         |           |
| Marsh Hawk                 | 16          |                            | 44 <sup>3</sup> |                     | 56       |             |               |                     |         |           |
| American Kestrel           | 1           |                            |                 |                     |          |             |               |                     |         |           |
| Sharp-tailed Grouse        | 6           |                            | 100             |                     |          |             |               |                     |         |           |
| Ring-necked Pheasant       | 8           |                            | 12              |                     | 25       | 38          | 12            | 13                  |         |           |
| Sora                       | 1           |                            |                 |                     |          |             |               |                     |         |           |
| Killdeer                   | 39          | 1.6                        | 41              |                     | 16       | 15          |               |                     |         |           |
| Upland Sandpiper           | 3           |                            |                 |                     |          |             |               |                     | 28      |           |
| Wilson's Phalarope         | 1           |                            |                 |                     |          |             |               |                     |         |           |
| Common Snipe               | 6           |                            |                 |                     |          |             |               |                     |         |           |
| Rock Dove                  | 6           |                            |                 |                     |          |             |               |                     | 100     | 100       |
| Mourning Dove              | 99          | 3.9                        | 56              | 6                   | 15       | 8           | 10            | 5                   |         |           |
| Burrowing Owl              | 1           |                            |                 |                     |          |             |               |                     |         |           |
| Short-eared Owl            | 8           |                            | 63              |                     | 37       |             |               |                     |         |           |
| Common Nighthawk           | 4           |                            |                 |                     |          |             |               |                     |         |           |
| Common Flicker             | 4           |                            |                 |                     |          |             |               |                     |         |           |
| Hairy Woodpecker           | 2           |                            |                 |                     |          |             |               |                     |         |           |
| Eastern Kingbird           | 35          | 1.4                        | 51              |                     |          | 43          |               | 6                   |         |           |
| Western Kingbird           | 7           |                            | 29              |                     |          | 57          |               | 14                  |         |           |
| Say's Phoebe               | 7           |                            | 14              |                     |          | 29          |               |                     |         |           |
| Horned Lark                | 809         | 32.0                       | 48              |                     | 52       |             |               |                     |         | 37        |
| Bank Swallow               | 9           |                            | 78              |                     |          |             |               |                     |         | 22        |
| Barn Swallow               | 40          | 1.6                        | 38              |                     |          | 3           |               | 2                   | 35      | 22        |
| Cliff Swallow              | 1           |                            |                 |                     |          |             |               |                     |         |           |
| House Wren                 | 5           |                            |                 |                     |          |             | 80            | 20                  |         |           |
| Rock Wren                  | 3           |                            |                 |                     |          |             |               |                     |         |           |
| Brown Thrasher             | 5           |                            |                 |                     |          | 20          | 80            |                     |         |           |
| American Robin             | 8           |                            | 37              |                     |          | 13          | 50            |                     |         |           |
| Sprague's Pipit            | 14          |                            | 100             |                     |          |             |               |                     |         |           |
| Loggerhead Shrike          | 7           |                            | 43              |                     |          | 57          |               |                     |         |           |
| Starling                   | 12          |                            | 50              |                     |          |             | 8             | 17                  |         | 25        |
| Warbling Vireo             | 1           |                            |                 |                     |          |             |               |                     |         |           |
| Yellow Warbler             | 5           |                            |                 |                     |          |             | 80            | 20                  |         |           |
| Yellowthroat               | 6           |                            |                 |                     |          | 83          |               | 17                  |         |           |
| Yellow-breasted Chat       | 2           |                            |                 |                     |          |             |               |                     |         |           |
| House Sparrow              | 7           |                            |                 |                     |          | 57          |               |                     |         | 43        |
| Bobolink                   | 9           |                            | 89              |                     | 11       |             |               |                     |         |           |
| Western Meadowlark         | 544         | 21.5                       | 70              | 7                   | 21       | 1           | 1             |                     |         |           |
| Yellow-headed Blackbird    | 2           |                            |                 |                     |          |             |               |                     |         |           |
| Red-winged Blackbird       | 71          | 2.8                        | 35              |                     | 15       | 50          |               |                     |         |           |
| Brewer's Blackbird         | 12          |                            | 75              |                     |          | 25          |               |                     |         |           |
| Brown-headed Cowbird       | 50          | 1.9                        | 76              | 6                   | 6        | 10          |               | 2                   |         |           |
| American Goldfinch         | 5           |                            | 40              |                     |          |             | 60            |                     |         |           |
| Rufous-sided Towhee        | 3           |                            |                 |                     |          |             |               |                     |         |           |
| Lark Bunting               | 230         | 9.5                        | 64              | 3                   | 33       |             |               |                     |         |           |
| Grasshopper Sparrow        | 53          | 2                          | 87              | 2                   | 9        | 2           |               |                     |         |           |
| Baird's Sparrow            | 40          | 1.6                        | 75              |                     | 25       |             |               |                     |         |           |
| Vesper Sparrow             | 33          | 1.3                        | 79              | 18                  |          | 3           |               |                     |         |           |
| Lark Sparrow               | 3           |                            |                 |                     |          |             |               |                     |         |           |
| Clay-colored Sparrow       | 2           |                            |                 |                     |          |             |               |                     |         |           |
| Brewer's Sparrow           | 3           |                            |                 |                     |          |             |               |                     |         |           |
| Field Sparrow              | 10          |                            |                 | 20                  |          | 40          | 10            | 30                  |         |           |
| Chestnut-collared Longspur | 248         | 9.8                        | 89              |                     | 11       |             |               |                     |         |           |

<sup>1</sup> Data from three survey routes with 85 total stops; two routes surveyed twice; one route once

<sup>2</sup> Percentages computed only for those species with over one percent composition

<sup>3</sup> Percent of observations for those species with five or more observations

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